



# **Environmental Protection Department**

## **Hazardous Waste Management Division**

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# **Closure Plan for the Building 419 Size Reduction Unit and Solidification Unit**

**EPA ID Number CA2890012584**

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**Lawrence Livermore National Laboratory**  
**University of California Livermore, California 94551**

Work is performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract No. W-7405-Eng-48.

**Hazardous Waste Management Division**

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**Lawrence Livermore National Laboratory**  
**University of California Livermore, California 94551**



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I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

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Keith Gilbert, Division Leader  
Hazardous Waste Management  
Environmental Protection Department

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Harry L. Galles, Department Head  
Environmental Protection Department

\_\_\_\_\_  
Date



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Dennis K. Fisher  
Associate Director  
Plant Operations  
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## APPENDICES

Appendix A	Sampling and Analysis Plan for the Building 419 Size Reduction Unit and Solidification Unit Closure
Appendix B	Health and Safety Plan for the Building 419 Size Reduction Unit and Solidification Unit Closure

## LIST OF ACRONYMS

ASTM	American Society for Testing and Materials
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DTSC	California Environmental Protection Agency, Department of Toxic Substances Control
EDTA	ethylene diamine tetracetic acid
EPA	U.S. Environmental Protection Agency
FFCA	Federal Facility Compliance Act
HEPA	High Efficiency Particulate Air (filter)
HWM	Hazardous Waste Management
LLNL	Lawrence Livermore National Laboratory
LSA	Low Specific Activity
LWRP	City of Livermore Water Reclamation Plant
OSP	Operational Safety Procedure
PCB	polychlorinated biphenyl
RCRA	Resource Conservation and Recovery Act
RWQCB	Regional Water Quality Control Board
SAP	Sampling and Analysis Plan
SSH&SP	Site Specific Health and Safety Plan
SOP	Standard Operating Procedure
SSO	Site Safety Officer
SW	Solid Waste
STLC	Soluble Threshold Limit Concentration
TAGG	Tank Assessment and Guidance Group
TRU	Transuranic
UBC	Uniform Building Code
UC	University of California
UST	Underground Storage Tank
WAA	Waste Accumulation Area
WET	Waste Extraction Test
ZHE	Zero Headspace Extraction

# **CLOSURE PLAN FOR THE BUILDING 419 SIZE REDUCTION UNIT AND SOLIDIFICATION UNIT**

## **A. CLOSURE PLAN**

This Closure Plan is prepared for the Building 419 (B419) Size Reduction Unit and Solidification Unit at Lawrence Livermore National Laboratory (LLNL). Closure of the units in B419 will follow closure requirements under Interim Status and the Federal Facility Compliance Act (FFCA) between the U.S. Environmental Protection Agency (EPA), the U.S. Department of Energy (DOE), and the California Regional Water Quality Control Board (RWQCB).

B419 is one of several LLNL Hazardous Waste Management (HWM) facilities which will undergo "final" closure when all activities at these facilities are discontinued. The revised closure plans were re-submitted separately to the California Environmental Protection Department of Toxic Substances Control (DTSC) and the EPA in June 1992. This document submission was in response to a Notice of Deficiency from DTSC. Since then, it has been decided to combine the plans and associated closure activities. LLNL intends to clean close these units. LLNL proposes to begin the closure of the units in late 1994 with completion of closure activities anticipated by the end of calendar year 1996.

At completion of closure, no mixed waste or hazardous chemical constituents will remain in the equipment or structural components of the units. This Closure Plan contains all the information necessary to effect clean closure of these waste management units by:

- Removing any mixed or hazardous waste inventory.
- Sampling for hazardous and mixed constituents.
- Removing all contaminated materials as regulated by Resource Conservation and Recovery Act (RCRA) and California Hazardous Waste Control law.
- Decontaminating equipment and structural components which handled mixed or hazardous waste.
- Performing verification sampling that will allow certification of completion of the closure process.

The closure performance standards and decontamination activities described in this Plan are applicable only to RCRA and California regulated hazardous chemical constituents and waste management unit components. *Reference to radionuclide contamination is included for defining mixed waste only.* Standards and methods for control of radionuclide contamination will be done in accordance with DOE Orders applicable to the handling and disposal of radioactive materials.

A B419 Sampling and Analysis Plan (SAP) is provided in Appendix A which provides a detailed description and procedures for closure sampling activities. Appendix B includes a Site Specific Health and Safety Plan (SSH&SP) which covers activities to protect workers and the environment. Decontamination procedures for the B419 closure activities are addressed in the following documents: HWM 593 - Decontamination of B419 Equipment and HWM 594 - Decontamination of B419 Structures. These procedures are maintained by HWM. The most current versions are to be used for closure activities and will be made available upon request.

## **A.1 General Facility Description**

LLNL is a multidisciplinary research and development facility that generates hazardous and mixed waste. LLNL is located about 40 mi. east of San Francisco, California, in the Livermore Valley. The LLNL main site occupies an area of approximately 821 acres in eastern Alameda County, adjacent to the City of Livermore. LLNL Hazardous Waste Management Facilities are located primarily in the southeastern and northeastern quadrants of the LLNL main site. Figure 1 shows the location of LLNL and the LLNL Hazardous Waste Management Facilities containing the LLNL waste management units.

LLNL is owned by the DOE and operated jointly by the University of California (UC) and the DOE. The EPA Identification Number for LLNL is CA 2890012584. Detailed information regarding LLNL facilities, operations, and objectives is contained in the main text of the LLNL Part B Permit Application in Parts I, IV, VI, and XIV.

## **A.2 Waste Management Units**

The Building 419 Size Reduction and Solidification Units were permitted under interim status. DOE has made the decision to close the B419 Size Reduction Unit and Solidification Unit under interim status. These units have not been included for operation in the latest submittal of the Part B Permit Application and are therefore not listed in A.2.a.

### **A.2.a List of Waste Management Units**

Building 233 Container Storage Unit  
Building 513 Solidification Unit  
Building 513 Shredding Unit  
Building 513 Container Storage Unit  
Building 514 Silver Recovery Unit  
Area 514 Waste Water Filtration Unit  
Area 514 Waste Water Treatment Tank Farm Unit  
Area 514 Storage Tank 514-R501 Unit  
Area 514-1 Container Storage Unit

And location of the proposed Area 514-1 Tank Blending Unit; Area 514-1 Portable Blending Unit; Area 514-1 Carbon Adsorption Unit; Area 514-1 Centrifugation Unit; and Area 514-1 Cold Vapor Evaporation Unit

Area 514-2 Container Storage Unit  
Area 514-3 Container Storage Unit  
Building 612 Portable Tank Storage Unit  
Building 612-1 Container Storage Unit  
Building 612-2 Container Storage Unit  
Building 612-4 Receiving, Segregation and Container Storage Unit  
Building 612-5 Container Storage Unit  
Building 612 Tank Trailer Storage Unit  
Building 612 Lab Packing/Packaging Container Storage Unit  
Building 612 Drum/Container Crushing Unit  
Building 612 Size Reduction Unit  
Building 612 Container Storage Unit  
Building 614 East Cells Container Storage Unit  
Building 614 West Cells Container Storage Unit  
Building 625 Container Storage Unit  
Building 693 Container Storage Unit.

Stand-alone closure plans for each LLNL waste management unit listed above are included in Part XIV of the LLNL Part B Permit Application.

A.2.b                    Modification to Unit

No modifications have been made to date to the Building 419 Size Reduction Unit and Solidification Unit; nor are modifications planned since the units will be closed under interim status.

**A.3                    B419 Waste Management Units**

A.3.a                    Unit Description

Building 419 was constructed by the Navy in the 1940s and used by the Navy for various purposes related to airplane maintenance. In later years, the building was used by a health chemistry program as an assay laboratory. Since 1975, the building has been used by LLNL for equipment decontamination and hazardous and mixed waste treatment (size reduction and solidification) activities. Hazardous and mixed waste treatment activities were temporarily discontinued late in 1989 pending a seismic evaluation of Building 419 to determine if it met the Uniform Building Code (UBC) seismic guidelines. In 1991, the seismic data were evaluated, and it was determined that Building 419 could not meet these guidelines; therefore, size reduction and solidification activities were not resumed. The solidification operation has been relocated to the Building 513 Solidification Unit and the size reduction operation is being relocated to the Building 612 Size Reduction Unit. These operations are covered under the LLNL Part B Permit Application.

Building 419 is a 7,860 ft<sup>2</sup> structure consisting of three areas. The middle area has a second floor; the other two areas have one floor. Figure 2 shows the layout of Building 419. RCRA regulated waste management activities were conducted only in rooms 124, 155, and 167. Size reduction activities occurred in the main room and the walk-in hood in

Room 124. The walk-in hood is equipped with high efficiency particulate air (HEPA) filters. The floors in Room 124 are epoxy-coated concrete in order to resist spills and facilitate decontamination. Solidification activities took place in rooms 155 and 167. Room 155 has a tile floor overlying concrete and is equipped with three laboratory chemical fume hoods (FHE 5, 8, and 12). Room 167 is north of Room 155 and has an epoxy-coated concrete floor and a walk-in hood (FHE-6).

The Building 419 Facility also includes the following:

- Storage yards (one located north of the building and one located southwest of the building) for the temporary storage of waste (less than 90 days) and for storage of both non-waste and waste equipment prior to decontamination and/or size reduction (B419A Waste Accumulation Area).
- Office areas (central area). Not used to store wastes.
- Battery Shop (added in 1970).
- Two (2) permitted 500-gal retention storage tanks and associated piping system located in the southwest storage yard in a below ground, open, concrete vault.

The B419-A Waste Accumulation Area (WAA) has undergone separate clean closure activities pursuant to the hazardous waste regulations. No hazardous or mixed waste activities were conducted in the office areas. The Battery Shop added south of B419 in 1970 is not associated with the HWM operations in B419. The two 500-gal underground storage tanks USTs 419-R1U4 and R1U5 were used to retain cleaning solutions and rinse waters generated from steam-cleaning operations from rooms 167, 155, and 124. Room drain openings to these tanks have been capped off and the tanks were removed from service in 1989. Closure of the tank system is being conducted by LLNL's Tank Assessments & Guidance Group (TAGG), Operations and Regulatory Affairs Division, under EPA hazardous waste generator tank requirements and guidelines. This tank system closure is addressed in a separate document and is under the purview of Alameda County Department of Environmental Health.

#### A.3.b. Size Reduction Activities

The Building 419 Size Reduction Unit consists of the walk-in hood in Room 124. Activities conducted within the room consisted primarily of equipment decontamination and equipment size reduction. Contaminated equipment was received at B419, decontaminated, and then released back to LLNL generators. The equipment was brought into Room 124 on a forklift. Some of the equipment had to be size reduced to facilitate decontamination activities. The size reduction took place in Room 124. Following size reduction, a HEPA-filtered vacuum was used to remove loose material (potentially hazardous and/or radioactive) from the equipment. Kimwipes and other absorbent materials were then used to wipe down the equipment to remove any contaminants. The decontamination methods employed included steam cleaning and other cleaning techniques. The equipment that could not be

decontaminated to appropriate levels was declared hazardous waste and size reduced if necessary in order to facilitate packaging the material for disposal. Equipment that was successfully decontaminated was reassembled, if necessary, and returned to the generator for further use. The decontamination and size reduction activities generated waste sludge and spent cleaning fluids that were either properly managed in containers at the associated WAA or placed in the Building 419 retention tanks, USTs 419-R1U4 and R1U5.

#### A.3.c. Solidification Activities

The B419 Solidification Unit comprises Rooms 155 and 167. The unit consisted of 3 laboratory chemical fume hoods and hand mixing tools located in Room 155. A portable drum roller/tumbler was located in Room 167.

When operations were in progress, both transuranic (TRU) and low specific activity (LSA) mixed wastes were treated. The wastes were neutralized prior to solidification by either raising the pH of the waste from less than 2 for caustics or lowering the pH from greater than 12.5 to approximately 7. Waste streams were typically acidic in nature. Approximately 5 to 10 gal of mixed waste were treated at B419 monthly. TRU mixed waste was received at B419 in 5-gal carboys. The waste was neutralized and small aliquots of the waste were transferred from the carboy to 1-gal paint cans. The waste was then placed in one of the fume hoods (FHE-5, FHE-12 in Room 155), and a solidification agent (e.g., Portland cement) and a catalyst hardener (e.g., sodium silicate) were added to the container. The mixture was stirred by hand. The process was repeated until 13 to 14 1-gal paint cans were approximately one-third full. Mixed waste containing mixed fission products was solidified in a similar manner or by using the drum roller/tumbler in Room 167.

#### A.3.d Equipment and Structures

This Closure Plan discusses the decontamination and disposition of equipment and structural components of these units. Prior to sampling in accordance with SW 846 and EPA test methods for evaluating solid waste, the equipment will be decontaminated following one of the methods outlined in Table 1. A presampling survey indicated that certain types and levels of hazardous, mixed, and/or radioactive contamination exist in the B419 equipment. In addition to this presampling survey, generator knowledge, historical records, and actual performed operations have helped to determine expected contamination of the equipment. Using this information, there are five pieces of equipment which are considered to be clean and free of contaminants. Clean equipment includes two ultrasonic cleaners, a parts washer, a sink, and a bake-out oven. However sampling, as outlined in the SAP, will be used to verify and certify that no contamination is present.

The safe and an 8-ft hood are suspected to be contaminated by radioactivity only. This equipment will be dispositioned according to DOE Orders. Equipment suspected to be contaminated with hazardous or mixed waste includes two 6-ft hoods (FHE-5 and FHE-12), an electropolisher, a vapor degreaser, a bake-out oven, and a vapor blaster. Sampling will be performed to verify the types of constituents. Depending upon the results of the sampling, the equipment will either be decontaminated, dispositioned, or disposed of as hazardous or mixed waste.

The B419 structural components include the walls, floors, piping system, HEPA filters, duct work, ceilings, roof, and two walk-in hoods. These structures are to be sampled in accordance with SW 846. Structures will be decontaminated depending upon the level of contamination found in the sampling analysis. The different levels of decontamination activities are: washing, wiping, removing paint, hydroblasting, and steam cleaning. No decontamination will take place if levels of RCRA and California hazardous contaminants are below regulatory parameters (see Section A.4 second bullet item). If the decontamination methods do not remove contaminants to the appropriate levels, whole structures will be considered waste and removed. Details of sampling and analysis and decontamination are addressed in the SAP and in section A.9 of this plan.

#### A.3.e Potential Historical Contaminants

Table 2 lists the potential contaminants associated with Building 419. These potential contaminants were identified based on operational history to date and the range of waste types that may have been accepted in accordance with the Part A permit application. The equipment received at the Building 419 Size Reduction Unit may have been contaminated by radioactive material and may have contained residual amounts of toxic metals.

#### A.3.f Containers Used for Waste Storage

Containers of waste are not stored at Building 419 nor were the units used as container storage units.

### **A.4 Closure Performance Standards**

This section describes the closure performance standards to be met by the closure activities presented in this Plan to clean close Building 419. The SAP provides detailed information about the closure performance standards. Upon completion of clean closure of Building 419, there will be no mixed or hazardous wastes or hazardous chemical residues remaining in the equipment and associated structural components as a result of the units' operation. This will preclude the need for post-closure care to control/prevent release of hazardous chemical constituents to the environment. The performance standards to be met in conducting clean closure are as follows:

- Sampling any areas of suspected contamination or surface cracks in the equipment and structural components as applicable.
- Conducting decontamination of the physical structures of the equipment and structural components so no chemical residues remain at concentrations above those for characteristic waste (as established in 40 Code of Federal Regulations [CFR] 261 SubPart C and 22 California Code of Regulations [CCR] Chapter 11). The SAP contains additional details on analytical evaluation. Concentrations will be adjusted as necessary to reflect any contaminants present in decontamination materials.

- Removing contaminated structures where repetition of decontamination activities does not achieve the above-described decontamination level criteria.
- Performing collection and disposition of decontamination solutions and wastes to an approved, permitted on-site or off-site treatment, storage, or disposal facility.
- Taking swipe sample and/or paint chips from the equipment and structural components in accordance to the SAP Section 5.3, Sampling and Analysis Methodology. The sample acquisition methodology for taking swipes or the paint chips will include bulk scrapings following a quadrature system. This is discussed in the SAP Section 5.4. Once analytical results are obtained from the sampling, further evaluation will be made to determine required decontamination or disposition of the unit. Swipe data which tests "non detectable" does not require further sampling or analysis. Swipe data which has detectable concentrations of hazardous constituents will be corrected to match regulatory units by factoring in weight and surface area of the item. Radioactivity detected on swipes will be compared and released according to DOE Orders.
- Following SW 846 sample frequency and selection requirements of which are outlined in Section 5.5 of the SAP. This sampling methodology is to include B419 equipment and associated structural components.
- Analyzing paint chip scrapings and samples will be done in accordance to SW 846 which is to test for metal and other contaminants. Analytical results from the testing will be compared to RCRA and California hazardous regulatory limits. The paint scrapings will be converted by factoring in weight percentage and surface area of the sampled equipment and structural components.
- Evaluating samples which identify hazardous constituents which do not have regulatory waste limits. Samples are to be evaluated in accordance to CCR 22 66261.24 b and c for toxicity characteristics.
- Verifying that the units' floor surfaces are clean and that the concrete itself is not contaminated with constituents resulting from previous hazardous waste operations.
- Disposition of B419 equipment and structural components will follow the SAP section 5.3. The reuse of materials will be evaluated by LLNL industrial hygienists, environmental analysts, and health physicists to ensure the material meets the requirements of LLNL policy for relocation of equipment.

Sections A.8 through A.10 describe the closure activities in detail. The following further describes the closure performance standards and how they minimize post-closure maintenance and provide post-closure hazard control.

#### A.4.a Maintenance Minimization

The intent of this Closure Plan is to eliminate, to the extent necessary to protect human health and the environment, the potential post-closure escape of residual contaminants or the migration of waste decomposition products to the ground, surface water, or atmosphere from Building 419, and thus reduce the need for post-closure maintenance and control. All closure activities will be conducted such that threats to human health and the environment are minimized. The Health and Safety Plan, Appendix B, outlines the safety precautions which are to be taken during the B419 closure activities. Closure activities include sampling to verify clean closure of Building 419 and to verify that further maintenance and control is not required.

The two units in Building 419 will be clean closed so as to eliminate the need for further maintenance. Decontamination procedures and selection of appropriate decontamination solutions are described further in Section A.9 of this Closure Plan. Verification sampling will be performed for the potential contaminants listed in Table 2 by swipe sampling the equipment and associated structural components to verify that no hazardous chemical constituents are present. If contamination is found, the contaminated areas will be decontaminated, and swipe sampling repeated, or the affected structure removed. Closure will then be considered complete.

All decontamination and rinse solutions and debris generated during decontamination activities will be collected, analyzed, and disposed of appropriately based on waste classification and in accordance with applicable requirements. Because the units are housed inside Building 419, there is no potential for rainfall to affect closure.

If hazardous waste contamination of equipment and structural components is detected through the closure sampling process, and if decontamination is not effective, the contaminated equipment and/or structural components will be removed and managed as hazardous or mixed waste as appropriate. The contaminated material will be properly packaged and stored at LLNL in a unit designated for hazardous or mixed waste storage, as appropriate, prior to ultimate disposal at a permitted off-site facility.

If during closure it is determined there is a possibility of extensive contamination underlying the building area, then an environmental restoration program will be initiated in accordance with the FFCA discussed in Section A.4.a.(1). This would entail:

- Adding a site evaluation phase to identify which hazardous substances had contaminated the site, their sources, and the extent of their transport and transformation.

- Evaluating information collected during this phase in order to determine site-specific remedial needs and those needs required for the Livermore Site Ground Water Project in accordance with provisions of the FFCA.
- Initiating a remedial investigation that encompasses field investigation and site and resource characterization.
- Establishing additional sampling plans and quality assurance protocols for this phase.
- Conducting a feasibility study to identify and evaluate alternative technologies to remediate and restore the environment.

Based on the findings of the feasibility study, and the review and approval of regulatory agencies, appropriate remedial action will be selected and implemented.

#### A.4.a.(1) Federal Facility Agreement

The U.S. EPA, the U.S. DOE, the DTSC, and the RWQCB entered into an FFCA under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 120 on November 2, 1988. Section VII of this Agreement, *Statutory Compliance/RCRA-CERCLA Integration*, states that the parties intend to integrate U.S. DOE's CERCLA response obligations and RCRA corrective action obligations which relate to releases of hazardous substances, hazardous wastes, pollutants, or contaminants. The parties intend that any remedial action selected, implemented, and completed under this Agreement shall be deemed by the parties to be protective of human health and the environment such that remediation of releases covered by this Agreement shall obviate the need for further corrective action under RCRA with respect to those releases. The parties agree that with respect to releases of hazardous waste covered by this Agreement, RCRA shall be considered an applicable or relevant and appropriate requirement pursuant to CERCLA. The parties intend that the judicial review of any corrective action requirements cited in any permit conditions which reference this Agreement shall to the extent authorized by law be reviewed only under the provisions of CERCLA.

#### A.4.b Post-Closure Hazard Control

At completion of clean closure of Building 419, all hazardous or mixed waste will have been removed to a permitted on-site or off-site facility for treatment, storage, and/or disposal. All equipment will have been decontaminated, or removed if necessary, and the decontamination verified. All wastes generated from decontamination activities and closure activities (e.g., decontamination solutions or other waste materials) will be packaged for treatment and/or storage on site, or treatment or disposal at an off-site facility. Since there will be no hazardous chemical residues or by-products thereof remaining on these units, post-closure hazard control is not expected to be necessary. If during closure it is determined that extensive contamination is present at these units and decontamination is ineffective, an environmental restoration investigation will be implemented as described in Section A.4.a.(1).

#### A.4.b.(1) Control of Hazardous Wastes

No wastes are now stored in the Building 419 Size Reduction Unit and Solidification Unit. Wastes generated from closure activities will be managed at an on-site permitted treatment or storage facility or to an off-site permitted treatment, storage, or disposal facility. Thus, post-closure control of wastes at these units will be unnecessary.

#### A.4.b.(2) Control of Hazardous Waste Constituents

LLNL intends to clean close the unit including decontamination or removal of contaminated structures and/or equipment. Thus, post-closure control of hazardous waste constituents at these units will be unnecessary.

#### A.4.b.(3) Control of Leachate

Leachate control is not applicable to waste management units such as the Building 419 Size Reduction Unit and Solidification Unit that have undergone clean closure as described in this Closure Plan.

#### A.4.b.(4) Control of Contaminated Run-Off and Rainfall

Because the Building 419 Size Reduction Unit and Solidification Unit are located within an enclosed building, rainfall and run-off will not affect closure activities.

#### A.4.b.(5) Control of Waste Decomposition Products

Waste decomposition products control will not be necessary because LLNL intends to remove all hazardous and mixed wastes and hazardous chemical residues to an on-site permitted treatment or storage facility or to an off-site permitted treatment, storage, or disposal facility.

### A.5 Partial Closure and Final Closure Activities

The scope of this Closure Plan involves clean closure of only two waste management units at LLNL. This Closure is considered partial closure of the total LLNL waste management units, but this Closure is considered complete closure of the two specified waste management units.

### A.6 Maximum Waste Inventory

#### A.6.a Maximum Extent of Operations

During operation (which was discontinued in late 1989), the maximum amount of equipment/items that could be size reduced in a single day was estimated at 5 short tons per day. For the Solidification Unit, the maximum extent of operations (maximum treatment capacity) during its active life was 16 drums of waste per day in the drum roller-tumbler and 5 gal/hr manually under the chemical fume hoods. These units do not presently treat or store

hazardous and mixed waste; the maximum extent of operations is included for historical perspective only.

**A.6.b**                    Computing the Maximum Inventory of Wastes

The estimate of 5 short tons per day that may have been processed in the Size Reduction Unit was based on the amount of material that could be size reduced in an 8-hr day. There is no inventory of waste present in the Solidification Unit. During operations in past years, only the volume of waste that could be treated was brought to the unit.

**A.7**                    **Schedule for Closure**

**A.7.a**                    Expected Year of Closure

LLNL will begin closure activities in late 1994 with completion of closure activities anticipated by the end of calendar year 1996.

**A.7.b**                    Frequency of Partial Closures

These closure activities will be considered a complete closure unless further contamination is found which will need to be addressed by the FFA. This issue is addressed in Section A.4.a.

**A.7.c**                    Closure Milestones

Figure 3 shows a milestone chart for closure of Building 419.

**A.7.d**                    Extension for Closure Time

Closure activities for the B419 Size Reduction Unit and Solidification Unit are expected to be completed in calendar year 1996. LLNL is requesting an extension of the prescribed 180 day period. LLNL does not expect to require an extension beyond the end of calendar year 1996; however, should it become necessary, LLNL will apply to DTSC for an extension.

**A.8**                    **Inventory Removal Procedures**

**A.8.a**                    On-Site Treatment or Disposal

No wastes will be chemically treated in Building 419 hazardous waste management units.

A.8.b                    Off-Site Treatment or Disposal

As of 1994, LLNL ships hazardous waste to off-site permitted facilities including but not limited to the following:

U.S.P.C.I./Grassy Mountain Facility  
3 mi. East, 7 mi. North of Exit #41 off I-80  
Clive, UT  
Mailing Address:  
P.O. Box 22750  
Salt Lake City, Utah 84122

Chemical Waste Management, Kettleman Hills Disposal Facility  
35251 Old Skyline Road  
Kettleman City, CA 93239

Romic Environmental Technology Corporation  
2081 Bay Road  
East Palo Alto, CA 94303

ENSCO Environmental Systems  
American Oil Road  
El Dorado, AR 71730

In the near future, the Nevada Test Site (near Las Vegas, NV) is expected to receive a permit for mixed waste disposal.

LLNL may use these facilities or other permitted facilities as they become available. All waste to be transported off-site will be packaged and labeled in accordance with applicable State and Federal regulations including U.S. Department of Transportation (DOT), EPA, and DTSC requirements.

A.8.c                    Transportation Distances to Off-Site Facilities

The approximate transportation distance to the off-site treatment and disposal facilities listed in Section A.8.b are:

Clive, UT	700 mi
Kettleman City, CA	175 mi
El Dorado, AR	1,900 mi
Las Vegas, NV	500 mi
East Palo Alto, CA	95 mi

## **A.9 Disposal or Decontamination of Equipment and Associated Structures**

In general, closure of B419 will consist of RCRA decontamination and/or removal of the equipment and structures (if necessary). All equipment is to be washed/wiped down prior to any sampling to be performed. B419 structures are to be sampled, and decontamination will be based on the extent and type of contamination. Sampling and analysis will test for both radioactive and hazardous waste constituents. Radioactive only wastes are to be addressed in accordance with DOE Orders. Mixed and hazardous contaminated equipment and structures are to be closed to meet RCRA performance standards. The areas decontaminated will be swipe sampled to confirm successful decontamination. All surfaces that are determined to be hazardous or mixed contaminated based on the results of the SAP will be decontaminated or demolished if additional decontamination is not feasible.

Following is an overview of the B419 closure activities including decontamination work to be performed:

1. Take grab samples of water from the spigot that will supply water for decontamination. Swipe samples will be included to determine background levels for hazardous and radioactive constituents which may be present. This is addressed further in Section 4.1 of the SAP.
2. Sample equipment suspected to be contaminated by hazardous or mixed waste in accordance with the SAP to verify the types of RCRA constituents. Depending upon the results of the sampling, the equipment will either be decontaminated, dispositioned, stored, or disposed of as hazardous or mixed waste.
3. Sample the B419 structure including walls, floors, ceilings, and roof for RCRA constituents. Structures will be decontaminated depending upon the type and level of contamination as determined in the SAP. No decontamination will be performed if contaminant levels are below performance standards. If decontamination methods fail to remove contaminants to appropriate levels, structures will be removed, packaged, and then either stored or shipped off site for disposal. Samples of stains will be taken according to the B419 SAP. In addition, samples will be collected where waste or contaminated liquid may have accumulated during the operating life of the unit.
4. Analyze the concrete scrapings for parameters identified in Table 2. Items will be dispositioned according to analytical results. Table 3 lists the parameters and sampling and analytical methods. The analytical results of the concrete scrapings will be compared to the regulatory limits. Bulk samples for organics will be evaluated against the appropriate method list in SW 846. The sample will be extended using ZHE, and the resulting extract analyzed for volatiles - 8010 (alternate - Method 8240 or Method 8260), semi-volatiles Method 8270 and PCB Method 8080. Should

analytical results indicate contamination in the soil samples, analysis will be performed on the samples taken at other depths to determine the extent of contamination.

5. Depending upon initial analytical results, decontaminate equipment and structure surfaces by washing and wiping with a detergent, using a hydroblaster or steam cleaner. Hydroblasting may be accomplished using appropriate cleaning agents (i.e., detergents, chelating agents) or water alone. Steam cleaning may be accomplished using similar substances. Table 3 summarizes the decontamination methods and cleaning agents that may be used for each of the various groups of contaminants that may be encountered. The decontamination method selected from Table 3 will be based on the type of contaminants anticipated. Decontamination procedures for the B419 activities are provided in the following documents: HWM 593 - Decontamination of 419 Equipment and HWM 594 - Decontamination of B419 Structures.
6. Collect waste waters (decontamination and rinse solutions) generated by decontamination activities within the secondary containment structure. The waste waters will be removed from the secondary containment structure using an auxiliary pumping system that will pump the collected waste water into a portable tank. Any residual liquid will be removed with absorbent material that will be collected in a 55-gal drum. The absorbent material will be handled as appropriate based on the analytical results of the sampled waste waters.
7. Perform verification sampling on equipment and structures in accordance with the SAP.
8. After clean closure has been verified, sample and analyze all collected decontamination and rinse solutions for the City of Livermore Water Reclamation Plant (LWRP) sewer discharge limits in effect at the time of closure.
9. Submit analytical results from waste waters to EPD for review and obtain authorization to discharge to the sanitary sewer.
10. Depending upon sample results, a determination will be made on what treatment or disposal options are needed. If analytical results for some waste waters are above the LWRP sewer discharge limits, they will be treated on site at B514 Waste Water Treatment Unit. Table 4 provides an estimate of quantities of waste to be generated during decontamination activities.

The specific sampling and analysis methodology is described in the SAP, including quality assurance and quality control.

All personnel who participate in closure activities at Building 419 will have appropriate training to perform the assigned tasks. Appropriate training for LLNL personnel is conducted through the HWM training program. This program is designed to meet regulatory requirements and provide personnel with knowledge on how to safely operate the LLNL waste management facilities. Any contractors or their subcontractors, as part of the contract requirements, must also provide evidence of employee training to perform hazardous and mixed waste management activities.

All employees, contractors, and subcontractors conducting closure activities will be briefed on this Closure Plan. Health and safety issues and training requirements (see Appendix B, Health and Safety Plan) or standard operating procedures (SOPs) for the specific closure will be addressed. Closure activities will be monitored by LLNL's Closure Project Leader and the Site Safety Officer (SSO). All cleanup work will be performed by qualified LLNL employees and/or subcontractors.

#### **A.10                    Demolition and Removal, Off-Site or On-Site Treatment or Disposal**

Building 419 will be considered completely closed once the verification sampling has demonstrated that all components of the units have been decontaminated to levels that achieve the RCRA closure performance standards. The concrete floor, walls, ceiling, and roof will be left in place unless sampling has demonstrated that hazardous chemical contamination cannot be removed. In that event, the entire floor will be removed with a jackhammer and concrete saws, and the material will be placed onto plastic sheets. A front-end loader will be used to place the debris into a dump truck for transport to a staging area. The debris will then be placed in suitable containers and transported to an off-site permitted treatment and disposal facility.

#### **A.11                    Contaminated Soil Removal**

If contamination which may require remediation is found during closure, removal of any areas of contaminated soil will be conducted according to the process described in Section A.4.a.

#### **A.12                    Contingent Closure Information**

A contingent closure plan is not anticipated per 40 CFR 265.112 and 22 CCR 265.112. However, contingent closure activities are discussed in Section A.4.a.

#### **A.13                    Closure Certification**

##### **A.13.a                Closure Monitoring**

LLNL representatives will monitor every major closure activity described in Sections A.8 and A.9 to verify that the activities are being conducted in accordance with this Closure Plan.

A.13.b                    Testing and Analyses to be Performed

All sampling and analyses will be conducted in accordance with the SAP. These data will be evaluated by the independent engineer during the closure certification process.

A.13.c                    Criteria for Evaluating Adequacy

Closure activities will be considered complete when the results of the verification sampling described above demonstrate that the units have been removed or cleaned to the closure performance standards specified in Section A.4. If any analytical results indicate levels of contamination of any component in excess of the closure performance standards, decontamination will be repeated for that component and any other components that might be subject to cross-contamination. Verification sampling will then be repeated. If decontamination cannot be adequately completed in accordance with the closure performance standards, a decision will then be made to remove the equipment/structure(s).

A.13.d                    Certification Activities

All closure activities will be reviewed by an independent, California-registered professional engineer to certify that these activities have been performed by qualified individuals and were completed in accordance with this Closure Plan. This engineer will review all log books, sampling and analytical data, and other closure records including waste manifests to certify that all activities have been properly completed. The independent engineer will not be from the owner or operator organizations. The independent engineer will maintain documentation of his/her closure inspections and reviews of all analytical and other data generated during closure. All partial closure activities will be documented by the project leader for closure. The partial closure certification will be submitted within 60 days after the completion of partial closure.

A.13.e                    Certification Documentation

Certification of closure will be provided by an independent California-registered professional engineer. The closure certification will be exclusive to the closure of the Building 419 Size Reduction Unit and Solidification Unit.

The certification will confirm that closure activities were conducted in accordance with the approved practices, techniques, and procedures specified in this Closure Plan. The closure certification will be accompanied by a signed certification statement as required by 40 CFR 270.11 and 22 CCR 66270.11.

The B419 Size Reduction Unit and Solidification Unit shall be considered closed after an independent engineer has certified completion of the closure activities and DTSC has acknowledged the certification in writing.

## **B. POST-CLOSURE PLAN**

A post-closure plan is not applicable per 40 CFR 265.110, 40 CFR 265.118(a), 22 CCR 66265.110, and 22 CCR 66265.118(a).

## **C. CLOSURE COST ESTIMATES**

Under 40 CFR 265.140(c) and 22 CCR 66265.140(c), the Federal government as the owner and operator of LLNL is exempt from the requirements to provide cost estimates and financial assurance mechanisms for closure actions.

## **D. POST-CLOSURE COST ESTIMATES**

Under 40 CFR 265.140(c) and 22 CCR 66265.140(c), the Federal government as the owner and operator of LLNL is exempt from the requirements to provide cost estimates and financial assurance mechanisms for post-closure actions.

## **E. CLOSURE PLAN AMENDMENTS**

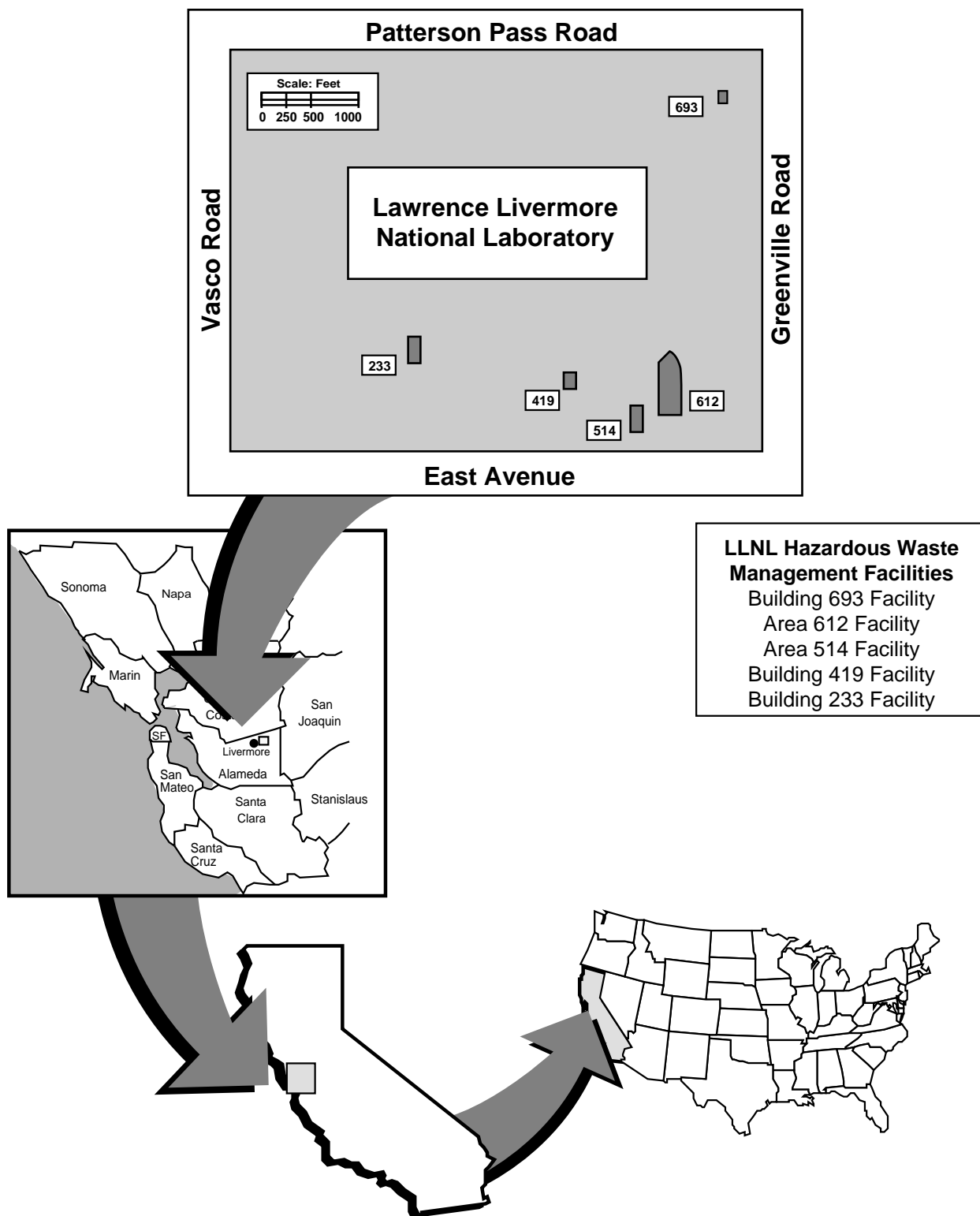
The Closure Plan for Building 419 Size Reduction Unit and Solidification Unit will be amended whenever:

- Unexpected events occur during closure activities that require modification of the approved Plan.
- Changes in State or Federal law or regulations affect the Plan.

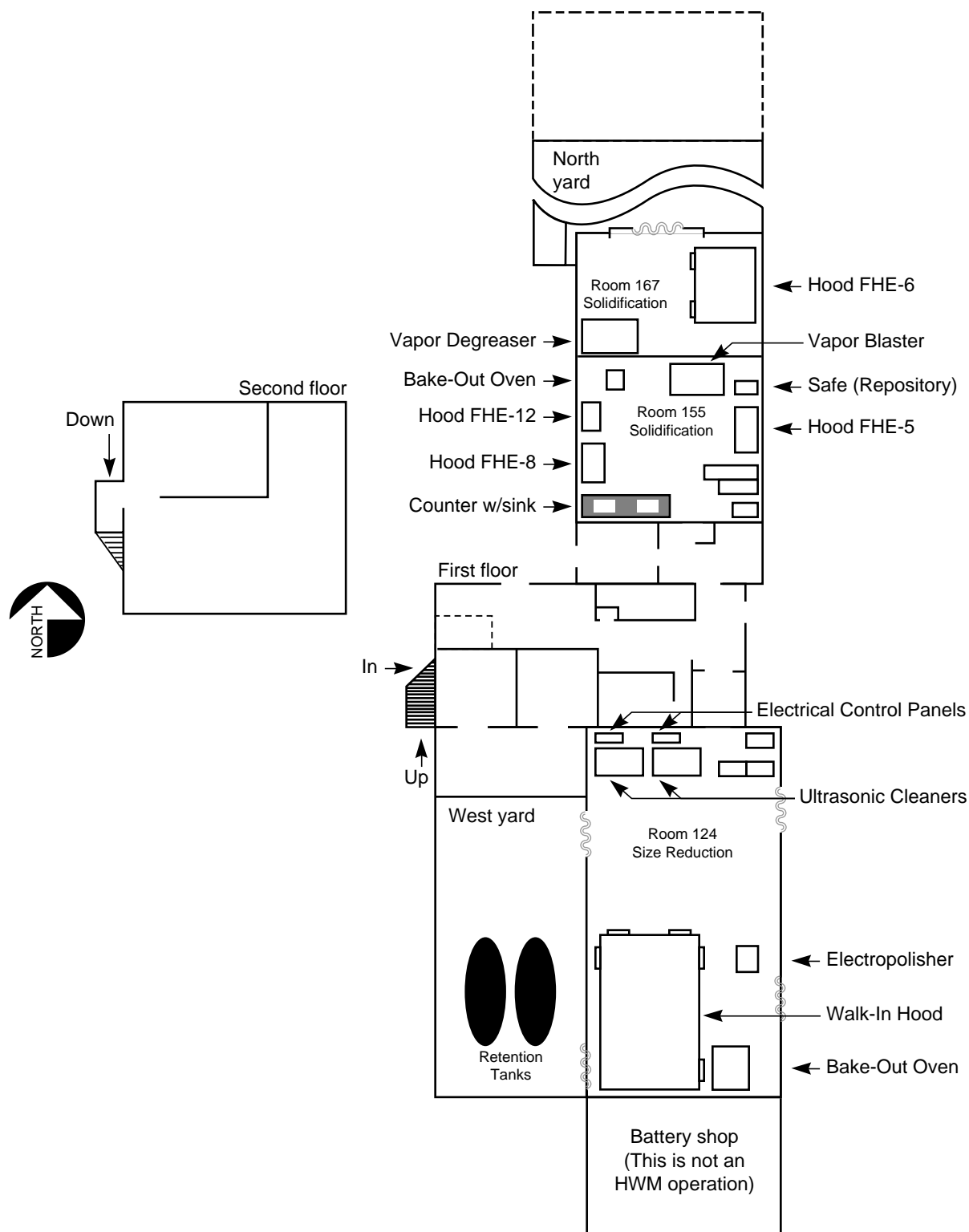
If such changes occur, a written request will be submitted to the California DTSC detailing the proposed change and explaining the rationale for the change.

## **F. REGULATORY AGENCY NOTIFICATION BEFORE CLOSURE**

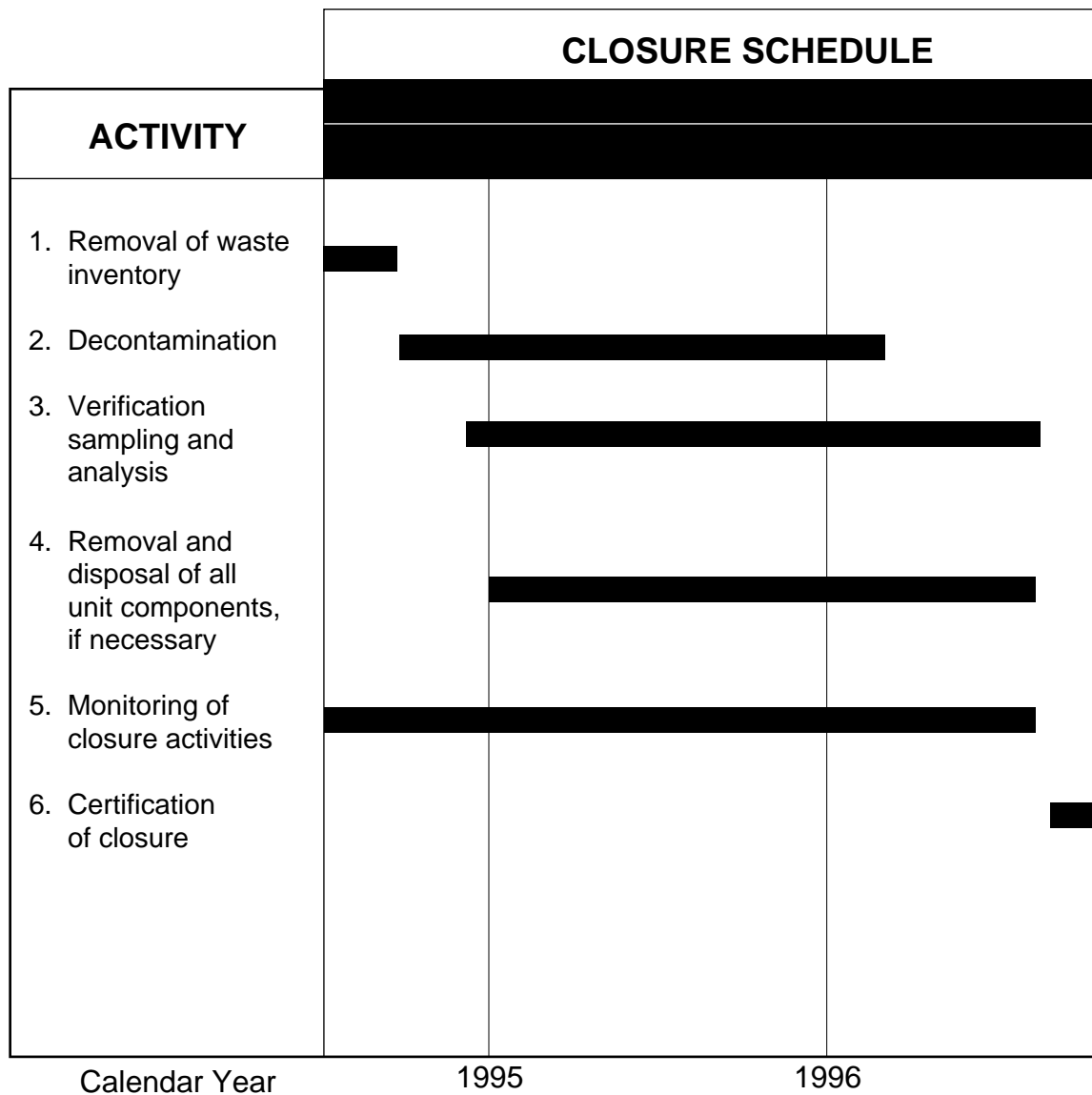
Closure activities for the B419 Size Reduction Unit and Solidification Unit will commence immediately.



**Figure 1. Location of Lawrence Livermore National Laboratory**



**Figure 2. B419 Layout**



**Figure 3.      Closure Plan Milestone Chart for B419**

**Table 1. Decontamination Agents**

Contaminant	Localized Area	Widespread Area
Radioactive materials	<ol style="list-style-type: none"> <li>1. Cloth wipes and detergent *</li> <li>2. Mild acid solution<sup>†</sup></li> <li>3. Top layer removal<sup>†</sup></li> </ol>	<ol style="list-style-type: none"> <li>1. High-pressure steam and water</li> <li>2. Mild acid solution<sup>†</sup></li> <li>3. Top layer removal<sup>†</sup></li> </ol>
Metals	<ol style="list-style-type: none"> <li>1. Cloth wipes and detergent *</li> <li>2. Chelating agent (EDTA disodium salt)</li> <li>3. Top layer removal</li> </ol>	<ol style="list-style-type: none"> <li>1. High-pressure steam and water</li> <li>2. Chelating agent (EDTA disodium salt)<sup>†</sup></li> <li>3. Top layer removal<sup>†</sup></li> </ol>
Oil and grease	<ol style="list-style-type: none"> <li>1. Cloth wipes and detergent *</li> <li>2. High-pressure steam and water<sup>†</sup></li> <li>3. High-pressure steam with trisodium phosphate<sup>†</sup></li> </ol>	<ol style="list-style-type: none"> <li>1. High-pressure steam and water</li> <li>2. High-pressure steam with trisodium phosphate<sup>†</sup></li> <li>3. Top layer removal<sup>†</sup></li> </ol>

\* Detergent to be used must contain trisodium phosphate.

<sup>†</sup> Only to be used if first procedural step fails to remove contamination.

**References:**

Unterberg, W. and R.W. Melvoid *et al.* (1989), *Reference Manual of Countermeasures for Hazardous Substance Release*, Hemisphere Publishing Corporation.

Esposito, M. P. *et al.* (1987), *Decontamination Techniques for Buildings, Structures, and Equipment*, Noyes Data.

**Table 2. Potential Historical Contaminants at the Building 419 Size Reduction Unit and Solidification Unit**

Contaminants	
Size Reduction Unit	Solidification Unit
Toxic metals (including beryllium, copper, chromium, arsenic, nickel, cadmium, mercury, and lead)	1,1-Dichloroethylene
Oil (e.g. lubricating oils, diffusion pump oils) and grease	1,2-Dichloroethane
Radionuclides	1,4-Dichlorobenzene
Freon	Acids and bases
methyl chloride	Carbon tetrachloride
TCE	Chlorobenzene
PCE	Chloroform
MEK	Toxic metals
	Methyl ethyl ketone
	Oil and grease
	Pyridine
	Radionuclides
	Spent cyanide plating solutions
	Spent cyanide stripping solutions
	Spent halogenated solvents
	Tetrachloroethylene
	Trichloroethylene

**Table 3. Parameters for Analysis and Analytical Methods for Bulk Samples, Swipes and Waste Water Generated from Decontamination Activities<sup>†</sup>**

<b>Parameter/Constituent</b>	<b>Method*</b>
Hazardous metals	California Waste Extraction Test (WET)
Volatile Organics	1310
Antimony	6010 or 7040
Arsenic	7060 or 7061
Barium	6010 or 7080
Beryllium	6010 or 7090
Cadmium	6010 or 7130
Chromium (total)	6010 or 7190
Chromium VI	7196
Copper	6010 or 7210
Total Cyanide	9010
Lead	6010 or 7420
Mercury	7470 or 7471
Nickel	6010 or 7520
Selenium	7740 or 7741
Silver	6010 or 7760
Thallium	6010 or 7840
Vanadium	6010 or 7910
Zinc	6010 or 7950
Volatile halogenated organics	8010, 8240 or 8260
Volatile aromatic	8020 or 8260
Semi volatiles	8270
PCB's	8080
Gross alpha	9310
Gross beta	9310
Tritium	ASTM D-2476
Oil and grease	9070

\* Refers to EPA SW-846, 3rd ed., unless otherwise note. ASTM is American Society for Testing and Materials.

<sup>†</sup> Parameters based on CCR Title 22, Section 66700 Zero Headspace Extraction (ZHE)

**Table 4. Estimates of Quantities of Waste to be Generated During Decontamination Activities**

<b>Equipment</b>	<b>Estimated Quantity to be Generated</b>	<b>Decontamination or Disposition Method</b>
Miscellaneous disassembly tools and reusable sampling equipment	20 to 30 items	Triple wash using hot pressurized water or steam cleaner. Collect rinsate in temporary sump for analysis. Perform two random swipe samples for each per the Sampling and Analysis Plan. Repeat wash if contaminated.
Disposable rubber gloves, boots, and other personnel protective gear	60 ft <sup>3</sup>	Drum for off-site disposal
Miscellaneous rags, paper, and disposable sampling materials	30 ft <sup>3</sup>	Drum for off-site disposal
Spent decontamination liquids	500- to 1,500-gal	Treated at the Area 514 Waste Water Treatment Tank Farm Unit or drummed for off-site treatment or disposal. Decontamination liquids may be released to sewer upon approval of EPD if they meet discharge limits of the Livermore publicly owned treatment works.

## Appendix A

**APPENDIX A**

**Sampling and Analysis Plan for the  
Building 419 Size Reduction Unit and  
Solidification Unit Closure**



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## 1.0 PROJECT DESCRIPTION AND INTRODUCTION

Building 419 at Lawrence Livermore National Laboratory (LLNL) was constructed by the Navy in the 1940s and used by the Navy for various purposes related to airplane maintenance. In later years, the building was used by an LLNL health chemistry program as an assay laboratory. Since 1975, the building has been used by LLNL for equipment decontamination and hazardous and mixed waste treatment (size reduction and solidification) activities. Hazardous and mixed waste treatment activities were temporarily discontinued late in 1989 pending a seismic evaluation of Building 419 to determine if it met the Uniform Building Code seismic guidelines. In 1991, the seismic data were evaluated and it was determined that Building 419 could not meet those guidelines, therefore activities were not resumed.

Building 419 is a 7,860 ft<sup>2</sup> structure consisting of three adjacent areas. The middle area has a second floor, the other two areas have one floor. The middle two story section is used as offices, whereas the other adjoining rooms were used for the decontamination and hazardous and mixed waste treatment (size reduction and solidification) activities. Figure 1 shows the layout of Building 419 and the related equipment and activity locations; Figure 2 shows the piping system; and Figure 3 the layout of the high-efficiency particulate air (HEPA) filters on the roof of Building 419.

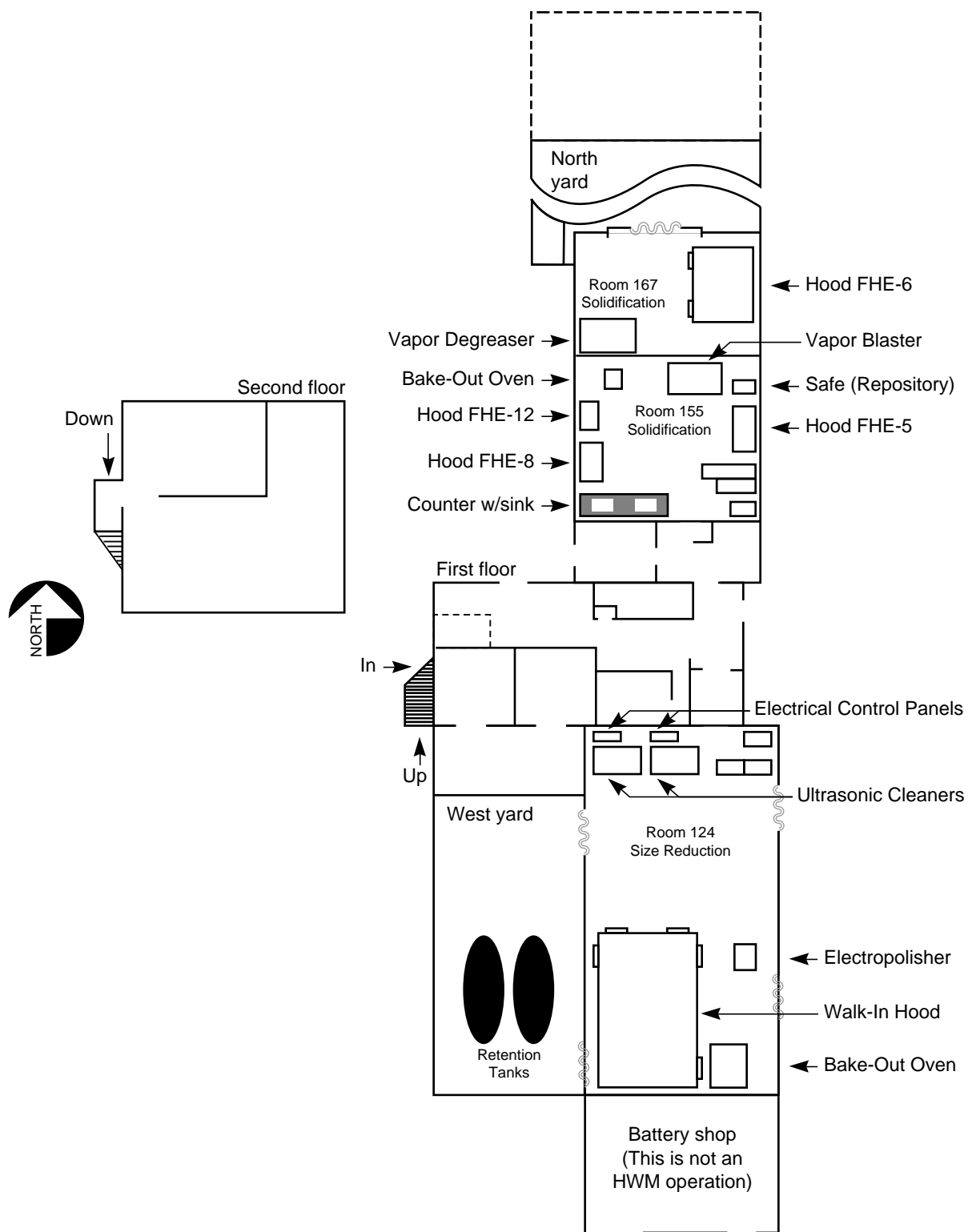
The purpose of this document is to establish the plan and procedures for the sampling and analysis of various pieces of equipment and associated structural components (e.g., floor tiles) in Building 419 in preparation for cleanup and RCRA closure of the Size Reduction Unit and Solidification Unit in Building 419. After cleanup and closure, the facility will be released for general use.

## 2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

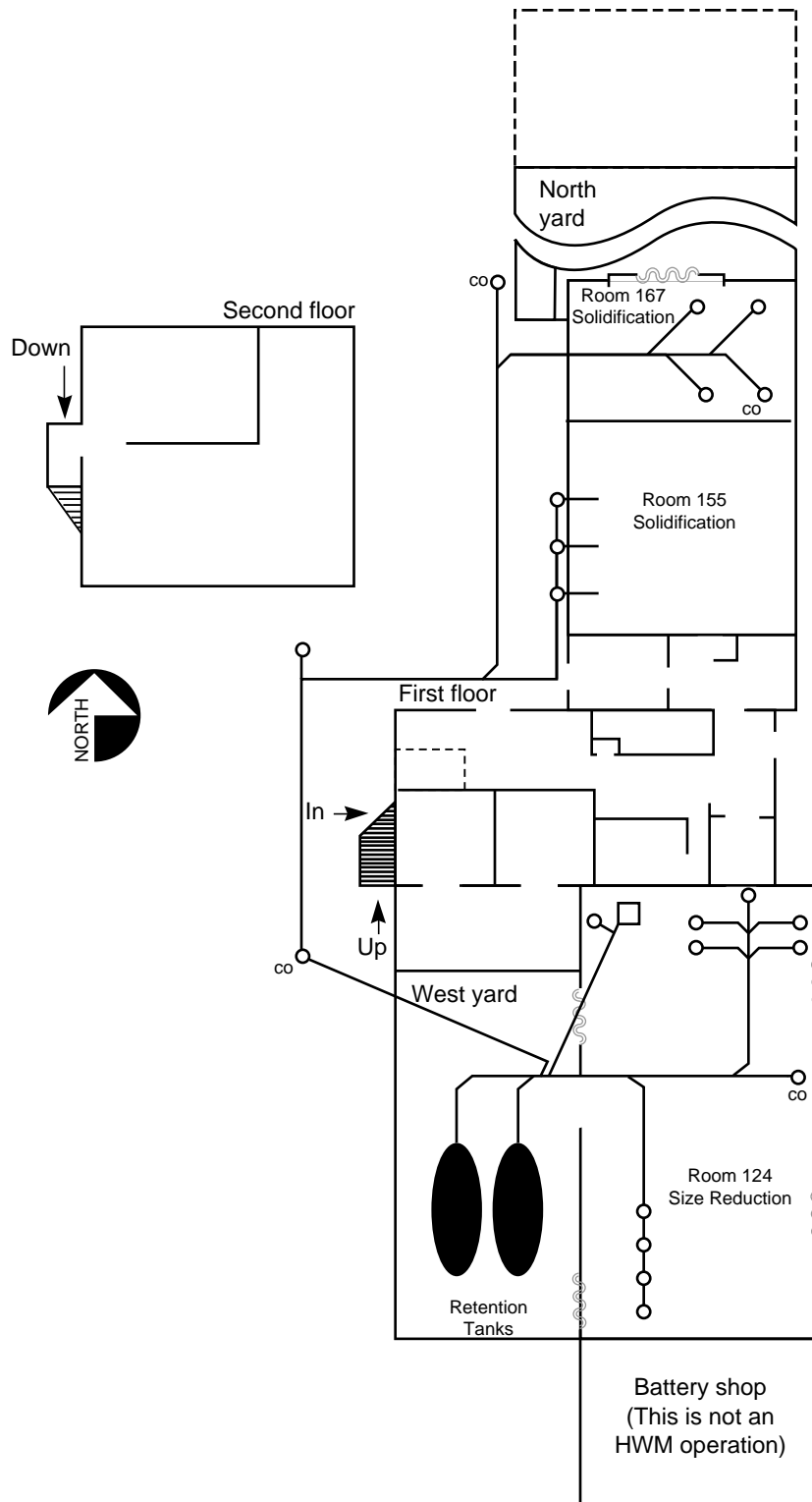
Several groups will be directly involved in the performance and review of this project. The Hazardous Waste Management (HWM) Division's Documents and Assessments (D&A) Group, the Hazards Control Department, and Permits and Regulatory Affairs Group from the Operations and Regulatory Compliance Division will review and approve the project as part of the decontamination and decommissioning (D&D) of Building 419. The Environmental Analytical Sciences (EAS) laboratory will be responsible for obtaining, tracking and analysis of all samples used in characterization of the equipment and the facility structure, in accordance with federal and State of California regulations, Title 40, Federal Code of Regulation (CFR), Part 261, and Title 22, California Code of Regulation (CCR), Section 66261, respectively.

The **EAS Laboratory Manager** assures that the sampling operation complies with federal and State regulations and with LLNL policies.

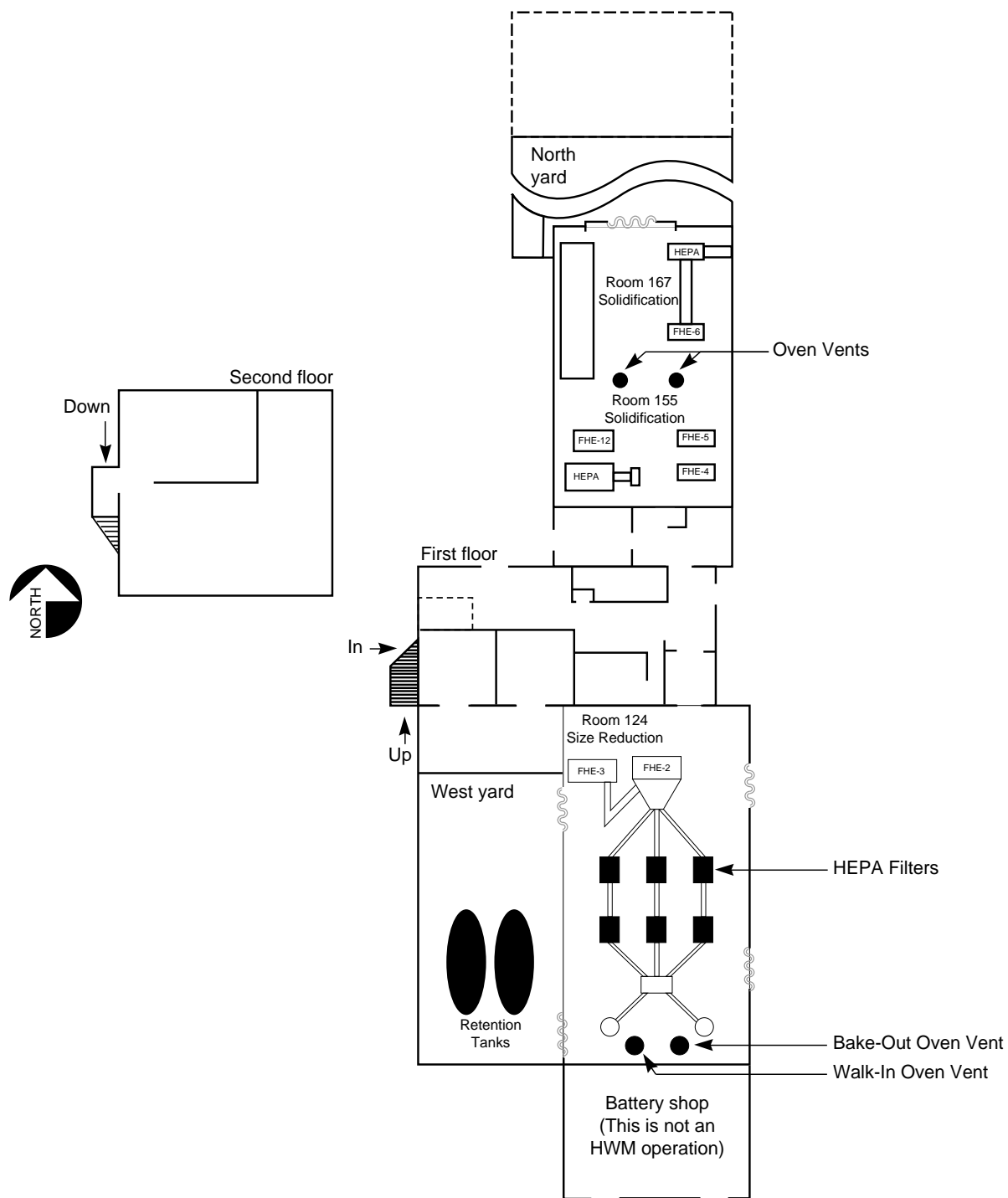
The **EAS Data Validator** reviews the records, data and analytical results to assure that the laboratory analysis has been carried out according to applicable EAS procedures.



**Figure 2-1 Schematic of Building 419 Showing Locations of the Various Activities**



**Figure 2-2 Schematic of Building 419 Showing Locations of Piping**



**Figure 2-3 Schematic of Building 419 Showing Locations of Roof HEPA Filters and Other Air Emission Points**

### The **Supervisor of Field Sampling Technicians**:

- Maintain files that identify the sampling technicians who are authorized to perform this sampling operation.
- Assures that the work is performed by trained and authorized individuals.
- Assures that all the sampling technicians adhere to the requirements of LLNL and EAS procedures.
- Provides health and safety guidance by initial evaluation of scheduled tasks.

The **Sampling Technicians** assigned to sampling operations are responsible for adhering to the requirements of LLNL and EAS procedures.

The **EAS Quality Assurance/Quality Control (QA/QC) Officer** audits EAS operations to assure that work performed in the EAS laboratory conforms to EAS procedures.

The **D&A Group Leader** reviews the work performed during the D&D operation to assure that it conforms to the requirements of the State of California Department of Toxic Substances Control .

The **Hazards Control Department** assures that work performed meets with the safety and health requirements of LLNL, including Industrial Hygiene and Health Physics requirements.

The **HWM Support Services Supervisor** is responsible for implementing this Sampling and Analysis Plan and the Building 419 Closure Plan and allocates personnel and resources to accomplish the work.

## **3.0 ANALYSIS CRITERIA**

Items (equipment and structural parts) to be dispositioned will be sampled and analyzed according to SW-846. Characterization is to be performed in accordance with 40 CFR 261, 22 CCR, and DOE Orders 5400.5 and 5480.11. Therefore, analytical data must be provided to ascertain the level of hazardous or radiological materials present and characteristics of the waste prior to disposal. To ensure these criteria, the bulk samples will undergo the Soluble Threshold Limit Concentration (STLC) Procedure. STLC is the threshold concentration of a bioaccumulative or persistent toxic substance extracted by the California Waste Extraction Test (WET). If the STLC is equaled or exceeded in a waste or waste extract as determined by 22 CCR Section 3.4, the waste or waste extract is hazardous. Swipe samples will be analyzed by the Total Threshold Limit Concentration (TTLC) Procedure. Total cyanide will be done on bulk samples from floors in Rooms 155 and 167 and from surface scrapings in the solidification hoods.

### **3.1 STLC and Total Threshold Limit Concentration (TTLC) Regulatory Concentrations**

Any waste is a hazardous waste that contains a substance listed in Table 3-1 or 3-2: (1) at a concentration in milligrams per liter as determined pursuant to 22 CCR Section 66261.24, Tables II and III, that exceeds its listed STLC, or (2) at a concentration in milligrams per kilogram in the waste that exceeds its listed TTLC.

**Table 3-1 List of Inorganic Persistent and Bioaccumulative Toxic Substances and their STLC and TTLC Values — WET Regulatory Limits**

Substance	WET Weight	
	STLC* mg/L	TTLC* mg/kg
Antimony and/or antimony compounds	15.	500
Arsenic and/or arsenic compounds	5.0	500
Asbestos* (as percent)		1.0
Barium and/or barium compounds (excluding barite) <sup>u</sup>	100	10,000
Beryllium and/or beryllium compounds	0.75	75
Cadmium and/or cadmium compounds	1.0	100
Chromium (VI) compounds	5.0	500
Chromium and/or chromium (III) compounds	560	2,500
Cobalt and/or cobalt compounds	80	8,000
Copper and/or copper compounds	25	2,500
Fluoride salts	180	18,000
Lead and/or lead compounds	5.0	1,000
Mercury and/or mercury compounds	0.2	20
Molybdenum and/or molybdenum compounds	350.	3,500
Nickel and/or nickel compounds	20	2,000
Selenium and/or selenium compounds	1.0	100
Silver and/or silver compounds	5	500
Thallium and/or thallium compounds	7.0	700
Vanadium and/or vanadium compounds	24	2,400
Zinc and/or zinc compounds	250	5,000

\* STLC and TTLC values are calculated on the concentrations of the elements, not the compounds.

- In the case of asbestos and elemental metals, applies only if they are in a friable, powdered or finely divided state. Asbestos includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

<sup>u</sup> Excluding barium sulfate.

**Table 3-2 List of Organic Persistent and Bioaccumulative Toxic Substances and their STLC and TTLC Values.**

Substance	WET Weight	
	STLC mg/L	TTLC mg/kg
Aldrin	0.14	1.4
Chlordane	0.25	2.5
DDT, DDE, DDD	0.1	1.0
2,4-Dichlorophenoxyacetic acid	10.0	100
Dieldrin	0.8	8.0
Dioxin (2,3,7,8-TCDD)	0.001	0.01
Endrin	0.02	0.2
Heptachlor	0.47	4.7
Kepone	2.1	21
Lead compounds, organic		13
Lindane	0.4	4
Methoxychlor	10.0	100
Mirex	2.1	21
Pentachlorophenol	1.7	17
Polychlorinated biphenyls (PCBs)	5.0	50
Toxaphene	0.5	5
Trichloroethylene	204.	2,040
2,4,5-Trichlorophenoxypropionic acid	1.0	10

### 3.2 Radiological Requirements

Bulk and swipe samples that require radiological analysis will be evaluated for radioactive release levels according to DOE Orders 5400.5 and 5480.11. Table 3-3 and 3-4 list the alpha, beta, and tritium release values.

**Table 3-3 Radiological Release Swipe Limits**

Parameter DPM/100 cm <sup>2</sup>	DPM/100 cm <sup>2</sup>
Alpha	20
Beta	200
Tritium	1000

**Table 3-4 Radiological Release Bulk Limits for Solids and Sludges**

Parameter	pCi/g
Alpha	1
Beta	3
Tritium	5

### 3.3 Organic Analysis Requirements

#### 3.3.1 Toxicity Characteristic Leaching Procedure (TCLP) Zero Headspace Extraction (ZHE) Limits

Bulk samples (i.e., soils) will be analyzed for organics and the results evaluated against the appropriate method list. The sample will be extracted using ZHE, and the resulting extract analyzed for volatiles (Method 8010), volatile aromatics (Method 8020 [alternate 8240 or 8260]), semi-volatiles (Method 8270), PCB (Method 8080), and cyanide (Method 9010).

## 4.0 QUALITY ASSURANCE OBJECTIVES

This section provides information on quality assurance (QA) objectives for the procedures and the data relevant to this Sampling and Analysis Plan. QA considerations for procedures include field and laboratory technique. Data quality is assessed by determination of the Precision, Accuracy, Representivity, Comparability, and Completeness (PARCC) parameters.

### 4.1 Quality Assurance Objectives for Measurement

QA is a management system for ensuring that all information, data, and decisions are technically sound and properly documented. All sampling and analysis activities performed by EAS described in this plan will be performed in accordance with the QA/QC practices described in this Sampling and Analysis Plan and per the Laboratory QA Plan and related procedures. Contract laboratories selected to perform any of the analytical tests will possess a DTSC Laboratory Certification and conform to the related certification QA/QC requirements. Contract laboratories QA/QC verification will be done by analysis of control samples and an onsite inspection.

This SAP contains guidance for the following:

- Sampling and decontamination
- Sample custody
- Calibration procedures and frequency
- Analytical procedures
- Data reduction, validation, and reporting
- Internal quality control checks
- Frequency, performance, and system audits
- Preventive maintenance
- Specific routine procedures used to assess data precision, accuracy, and completeness
- Corrective actions
- QA reports to management.

These parameters are either included in this SAP or in the referenced procedures.

This section summarizes QA/QC practices that will be followed during the execution of this plan and will produce data capable of withstanding, if needed, scientific and legal evaluation.

**Field Quality QA/QC**— Field QA/QC is ensured by uniform sample collection, handling, chain of custody, and shipping procedures and by evaluation of quality control samples collected in the field. Field samples used to assess quality control are discussed below.

- **Field Blanks** — Field blanks are defined as samples of American Society of Testing Materials (ASTM) 1193 Type II water from the same source as water used for decontamination and any matching matrix (i.e., soil, cement, etc.). One field blank should be prepared for each sampling event and analyzed for the same analytes as the samples collected that day. Field blanks are prepared and preserved using sample containers from the same lot as that used for the other samples collected that day. Results of the field blank analysis will help determine the level of contamination introduced into the sample because of sampling technique and will serve as a check of the water used for decontamination. These blanks will identify compounds inadvertently introduced into the samples during shipment or by contaminated sampling equipment.
- **Trip Blanks** — Trip blanks are defined as samples of ASTM 1193 Type II water from the same source as water used for decontamination. A trip blank is similar to a field blank, except that the container is not opened in the field.
- **Rinsates (equipment blanks)** — Rinsates are defined as the final analyte-free water rinse from equipment cleaning collected during a sampling event. The sample is analyzed for the same analytes as the samples collected that day. The results of the rinsate analyses will be used to flag or assess the level of analytes in the samples. This procedure enables evaluation of the decontamination process, the final rinse water, and the sample containers for contamination. Rinsates should be collected for every 20 samples collected.

- **Swipe Blanks** — Unused swipe tabs that are included in the analytical process per sample batch.
- **Field Replicates** — Field replicates are defined as independent samples collected in such a manner that they are equally representative of the variables of interest at a given point in space and time. The laboratory uses the field replicate as laboratory replicates or matrix spikes. Replicate samples provide an estimate of sampling precision.

**Laboratory QA/QC**— This section contains laboratory practices that ensure analytical QA/QC.

- **General Laboratory Controls** — The following analytical controls must be implemented in addition to instrument calibration and the analysis of QC samples and will be required of the laboratory performing the analysis. These requirements are standard in a Certified Laboratory and will be verified during the laboratory inspection and validation process:
  - Reagents and solvent will have certified compositions.
  - Reagent storage environment and duration will meet the manufacturers' guidelines.
  - Laboratory equipment will be calibrated/standardized following the referenced procedures for the methods used and shall be documented.
  - Volumetric measurements will be made with certified glassware.
  - Data reduction computations will be independently checked.
  - Qualified personnel will be used for laboratory analyses.
  - Quality assurance/quality control requirements and guidelines specified in the selected analytical methods will be followed.
- **Laboratory QA/QC** — Samples will be spiked with a known concentration of an analyte and analyzed to determine the accuracy as percent recovery. The percent recovery will be recorded on the analytical QC forms. If the results fall outside internal limits, the samples will be re analyzed. Examples of laboratory QC samples are included below.
  - **Method Blanks** — Method blanks usually consist of laboratory reagent-grade water treated in the same manner as the sample (e.g., digested, extracted, distilled, etc.) and then analyzed and reported in the same manner as a standard sample.
  - **Method Blank Spike** — A method blank spike is a sample of laboratory reagent-grade water fortified (spiked) with the analytes of interest, which is prepared and analyzed with the associated sample batch.
  - **Laboratory Control Sample for Inorganics** — This is a standard solution with a certified concentration that is analyzed as a sample and used to monitor analytical accuracy (equivalent to a method blank spike).
  - **Matrix Spikes** — A matrix spike is an aliquot of an investigative sample that is fortified (spiked) with the analytes of interest and analyzed with the associated sample batch to monitor the effects of the investigative sample matrix (matrix effects) on the analytical method.
  - **Laboratory Duplicate Samples** — Duplicate samples are obtained by splitting a field sample into two separate aliquots and performing two separate analyses on the

aliquots. The analysis of laboratory duplicates monitors sample precision; however, it may be affected by nonhomogeneity of the sample, particularly in the case of nonaqueous samples. Duplicates are performed only in association with selected protocols. Laboratory duplicates will be specified by the analytical methods or one per batch of samples, whichever is greater.

- **Known Laboratory QC Check Sample** — This is a reference QC sample of known concentration, obtained from the EPA, the National Institute of Standards and Technology, or a Nuclear Regulatory Commission-approved commercial source. This QC sample checks the accuracy of the analytical procedure.

#### **4.2 Precision, Accuracy, Representivity, Comparability, and Completeness**

All data will be evaluated according to the PARCC parameters in order to have a level of assurance of the quality of the measurement data. These characteristics are necessary when considering the usefulness of a set of data for interpretation.

**Precision** — Precision measures the reproducibility of measurements under a given set of conditions. It is a quantitative measure of the variability of a group of measurements compared to their average value. Precision is assessed by means of laboratory duplicate/field replicate sample analysis and is usually stated in terms of standard deviation or relative standard deviation (coefficient of variation).

Field precision will be assessed by replicate samples, field audits, and checklists performed on a routine basis. These audits will document the use (or non use) of uniform sampling methods, and handling and shipping procedures. Laboratory precision is assessed by duplicate samples and laboratory splits.

**Accuracy** — Accuracy refers to the nearness of a result, or the mean of a set of results, to the true or accepted value. Accuracy measures the average or systematic error of a method. Accuracy may be determined by the evaluation of the results of field/trip blanks, field replicates, check samples, and matrix spikes. Accuracy is most often expressed as the percent recovery of the measurement of a sample with known concentration of the analyte of interest.

Field accuracy will be evaluated from the results of field audits including on-site assessment of sample collection procedures, instrument performance, and calibration procedures. Sampling accuracy will also be assessed through the use of trip blanks and field blanks and replicates. These blanks will identify compounds inadvertently introduced into the samples during shipment or from contaminated sampling equipment.

**Representivity** — Representivity expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. The Representivity of a sample is a qualitative parameter mainly concerned with sample collection design. Representivity is best satisfied by making sure that the sampling locations are selected properly (representative of a given point in space and time) and that a sufficient number of samples are collected.

The following criteria must be met to provide evidence of Representivity:

- Material content of sampling equipment and sampling containers meet criteria for acceptability of parameters to be analyzed.

- Sampling procedure does not alter samples regarding parameters of concern.
- Sample preservation procedures meet criteria for acceptability of parameters and media to be analyzed.
- Contamination of field blanks is not evident.
- Decontamination of sampling equipment between samples reveals no apparent cross-contamination.
- Collection of samples in space and time is adequate to represent the condition of concern
- The actual measurement result represents the concept or parameter that is of interest.

**Comparability** — Comparability refers to the qualitative parameter expressing the confidence with which different data sets can be compared. Sample data should be comparable with other measurement data for similar samples and sample conditions. To ensure comparable results, standard techniques are used to collect and analyze representative samples. Analytical results will be reported in appropriate units for convenient comparison to historical data.

**Completeness** — Completeness of the data is the amount of valid data obtained from a measurement system versus the amount of planned data. Completeness is the percentage of measurements made that are judged to be valid. The criteria specified for precision, accuracy, representivity, and comparability for each analytical method used must be validated in order to fulfill the completeness goals.

### **4.3 Audits**

The Environmental Monitoring & Analysis Division (EMAD) audits EAS procedures to assure conformance to applicable portions of all Environmental Protection Department and EMAD QA plans and procedures.

### **4.4 Procedures**

The EAS Sampling Procedures to be used by the Sampling Team are the latest version of any applicable EAS Procedure Series.

### **4.5 Sample Control**

Analytical sample custody and the analytical sample custody log are addressed in the following EAS procedures:

- EAS-201, Analytical Sample Custody
- EAS-202, Sample Log In

### **4.6 Sample Tracking and Data Control**

Analytical samples and data will be tracked using the following EAS procedures:

- EAS-203, Data Tracking
- EAS-302, Sampling Technician Notebook

### **4.7 Data Evaluation**

The resulting data will be evaluated according to the following.

- Paint chips, scrapings, and swipe samples are to be analyzed in accordance with SW-846 to test for metal and other contaminants. Analytical results from this testing will be compared to RCRA and California Hazardous regulatory limits. Data will be converted by factoring in weight % and surface area of the sampled equipment or structural components.
- Samples that identify hazardous constituents that do not have regulatory waste limits will be evaluated in accordance with 22 CCR 66261.24 b and c for toxicity characteristics.
- Swipe data from the radiological analysis will be evaluated in accordance with DOE Orders 5400.5 and 5480.11.

#### **4.8 Reports**

At the completion of the sampling and analysis effort, a report will be generated summarizing the analytical results.

### **5.0 SAMPLING**

#### **5.1 Sampling and Analysis Procedures**

All sampling and analysis will be performed using EAS procedures and EPA Test Methods for Evaluating Solid Waste (SW-846). Specific EAS procedures are as follows:

- EAS-107, Quality Control
- EAS-300, Sampling QC
- EAS-301, Sampling Containerized Solids
- EAS-App 301/1, Sampling of HEPA Filters
- EAS-306, Sample Swiping and Surveying.

The applicable SW-846 method will be selected dependent on the constituent(s) suspected from a specific waste stream.

#### **5.2 Sample Analysis**

Radioactive swipes will be counted by Hazards Control using their specific procedures (HP-3 Manual).

Bulk samples for radiological analysis will be analyzed by Radiological Analytical Sciences using their specific procedures (see Table 5-1).

Bulk and swipe samples for metals will be processed through EAS using the methods listed in Table 5-1.

Bulk scrapings will be analyzed, where applicable, for TTLC metals, STLC metals, radioactivity (alpha, beta, tritium) solvents, and cyanide .

#### **5.3 Sampling and Analysis Methodology**

Sampling and analysis will be done with waste minimization as a goal, with special emphasis on mixed waste minimization. Therefore, we will first attempt to decontaminate equipment by washing the surface using technique(s) listed in Table 5-2. (See HWM Decontamination Procedure No. 593 for more details.) Based on data from a presampling survey, which is available upon request from the HWM D&A Group Leader, there seems to be only a few specific contaminated locations in the

facility. After sample results are evaluated to determine the level of contamination and compared to their respective regulatory limit, appropriate decontamination activities will be used as needed. If analytical results are equal to or exceed regulatory limits for any Resource Conservation and Recovery Act (RCRA) components, the item will be decontaminated until analytical results are below regulatory levels. If it is determined that further decontamination effort will not remove the identified contamination, then decontamination activities will cease and the item will be dispositioned according to the level and type of contamination. After completion of decontamination activities, verification sampling and analysis will be performed on all structural surfaces to confirm that no regulatory limits for RCRA constituents are exceeded. Radiological swipe data will be compared to criteria in DOE Orders for determination of contamination levels for release. Swipe data for RCRA hazardous constituents will be corrected to match regulatory limits by factoring in weight and surface area of the item. A final verification report will be issued describing results of the analysis. Items and bulk streams will be evaluated based on process knowledge and analytical results for one of five designations:

- 1) Mixed Waste - material having RCRA hazardous constituents and radiological levels over the respective regulatory and moratorium limits.
- 2) Low Level Waste - material containing radiological levels over the moratorium limits, but RCRA and/or State of California hazardous constituents below the respective regulatory limits.
- 3) Hazardous Waste - material having RCRA and State of California hazardous constituents over the regulatory limit.
- 4) Scrap - material with RCRA and/or State of California hazardous constituents and Radiological levels below the respective regulatory or moratorium limits.
- 5) Reuse - material that passes the evaluation of LLNL policy on relocation by the Industrial Hygienist, Environmental Analyst, and Health Physicist.

**Table 5-1 Parameters for Analysis and Analytical Methods for Bulk Samples, Swipes, and Waste Waters Generated from Decontamination Activities†**

Parameter/Constituent	Method*
Hazardous Metals	Waste Extraction Test
Antimony	6010 or 7040
Arsenic	7060 or 7061
Barium	6010 or 7080
Beryllium	6010 or 7090
Cadmium	6010 or 7130
Chromium (total)	6010 or 7190
Chromium VI	7196
Copper	6010 or 7210
Total Cyanide	9010
Lead	6010 or 7420
Mercury	7470 or 7471
Nickel	6010 or 7520
Selenium	7740 or 7741
Silver	6010 or 7760
Thallium	6010 or 7840
Vanadium	6010 or 7910
Zinc	6010 or 7950
Volatile halogenated organics	8010, 8240 or 8260
Volatile aromatic	8020 or 8260
Semi volatiles	8270
PCB's	8080
Gross alpha	9310
Gross beta	9310
Tritium	ASTM D-2476
Oil and grease	9070

\* Refers to EPA Test Methods for Evaluating Solid Waste (SW-846), 3rd ed., unless otherwise noted.

† Parameters based on 22 CCR Section 66700.

**Table 5-2 Examples of Some Decontamination Techniques**

Contaminant	Localized Techniques	Widespread Techniques
Radioactive Materials	1. Clothwipes and detergent* 2. Mild acid solution <sup>†</sup> 3. Top layer removal <sup>†</sup>	1. High-pressure steam and water 2. Mild acid solution <sup>†</sup> 3. Top layer removal <sup>†</sup>
Metals	1. Clothwipes and detergent* 2. Chelating agent (EDTA) 3. Top layer removal	1. High-pressure steam and water 2. Mild acid solution <sup>†</sup> 3. Top layer removal <sup>†</sup>
Oil and Grease	1. Brush and detergent* 2. High-pressure steam and water <sup>†</sup> 3. High-pressure steam with trisodium phosphate <sup>†</sup>	1. High-pressure steam and water 2. High-pressure steam with trisodium phosphate <sup>†</sup> 3. Top layer removal <sup>†</sup>

\* Detergents to be used must contain trisodium phosphate.

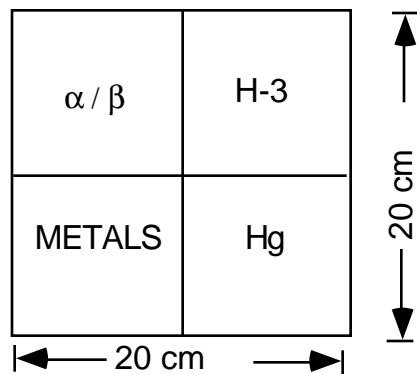
<sup>†</sup> Only to be used if first procedural step fails to remove contamination.

Unterberg, W. and R.W. Melvoid, et al. (1989), *Reference Manual of Countermeasures for Hazardous Substance Release*, Hemisphere Publishing Corporation.

Esposito, M. P., et al. (1987), *Decontamination Techniques for Buildings, Structures, and Equipment*, Noyes Data.

#### 5.4 Sample Acquisition

For consistency, the following quadrate diagram (see Figure 5-1) will be used for obtaining swipes and bulk scrapings. The quadrate is based on the need for four distinct analyses per area of concern. It allows for a consistent sampling scheme regardless of location. For convenience, this approach will be referred to as a “quad.” The quadrate is 20 cm x 20 cm, having four equivalent 100-cm<sup>2</sup> swiping or scraping areas.

**Figure 5-1 Sampling Quadrate**

Quadrate guidelines:

- 1) Randomly select a sampling location point, which will be the center of the quadrate at frequencies chosen as discussed below in section 5.5.

- 2) For surface contamination, swipe 100 cm<sup>2</sup> for each target analyte.
- 3) For painted surfaces:
  - a) Take a surface swipe.
  - b) Wash down the quad surface.
  - c) Take a sample by scraping below the swiped area of the quadrant for possible contaminants in the paint or coating. Approximately 100 grams of sample will be needed for the various analyses. If necessary, uniformly expand out the quadrant to obtain enough sample.
- 4) When applicable, take a scraping of the underlying wall beneath any coating layer while still matching the original quadrant selection site. This approach will give the basis for a comparison of the different analytes in the same stratified area.
- 5) Record all information in a field log book.

## 5.5 Sampling Frequency and Selection

Sampling frequencies were calculated using SW-846, Chapter 9, and the cube root of the population, where the population is the number of possible quad locations for a given area. The SW-846 equations were applied using the pre sample survey data for mercury and beryllium, in these cases the data calculated to a frequency of less than one sample. Due to the low concentration of contaminants, the cube root of the population will be used as the source for sample frequency. At the completion of the sampling and analysis effort, a report will be generated summarizing the analytical results.

### 5.5.1 Equipment

#### **General Instructions:**

- 1) Wash down item surface, using an appropriate decontamination technique when appropriate, prior to sampling.
- 2) Grid out the area in equal quad sections
- 3) Using a random number generator, randomly select a sampling location point for the center of the quad on the bottom and sides (inside and outside) of the item.
- 4) Swipe according to quadrature scheme.
- 5) The aqueous waste stream generated during wash down of equipment and structural materials will be collected in a portable tank, sampled, and analyzed, and then sent to Building 514 for treatment and subsequent disposal. Resulting dry waste, i.e., kimwipes, rags, etc., will be containerized, characterized, and sent to the Area 612 Facility for subsequent disposal.

**NOTE: Before removal, mark edge of equipment placement on floor for subsequent sampling.**

Any associated ducting is considered part of the specific piece of equipment. Therefore, remove any ducting and place it with the associated equipment for dispositioning. Cap off the duct at the ceiling.

#### **Room 124**

- Ducting — Swipe inside and outside, one quad per 5-ft length or shorter, and at elbows.

- Ultrasonic cleaners — Three quads: inside bottom, side (inside and outside).
- Parts washer — Three quads: inside bottom, side (inside and outside).
- Electropolisher — Remove and sample residue. Bulk analysis for characterization; STLC full radiological. Three quads: inside bottom, side (inside and outside).
- Bake-out oven — No wash down. Three quads: inside roof, outside door, and top. Three scrapings of fire brick for bulk radiological and STLC metals analysis.
- Parts washer — Three quads: inside bottom, side (inside and outside).

### Room 155

- Sink — Five quads: inside bottom, side (inside and outside), one quad on each side of bench table top.
- Bake-out oven — No wash down. Three quads: inside roof, outside door, and top. Three scrapings of fire brick for bulk radiological and STLC metals analysis.
- Eight-foot hood (stainless) — Seven quads, inside roof, inside door, back wall and work surface. Outside door, top and inside floor of bottom cabinet..
- Six-foot hoods (2) — Seven quads, inside roof, inside door, back wall and work surface. Outside door, top and inside floor of bottom cabinet.
- Vapor blaster — Three quads: inside bottom, side (inside and outside).
- Safe — Four quads: inside bottom, top, side (inside and outside).

### Room 167

- Vapor degreaser — Three quads: inside bottom, side (inside and outside). Additional swipes and scraping samples from four equidistant points around the item and one location under the item will be analyzed for solvents (volatile and semi- volatile).

#### 5.5.2 Structure

- **Walk-in hood, Room 124** — 13 quads: inside bottom at drain, inside center of each door, ceiling, and walls; outside center top, each door and walls. The waste stream generated from the paint removal will be drummed and randomly sampled for STLC metals and bulk radioactivity. Any liquid will be transferred to Building 514 for treatment and disposal. If the paint is found to be contaminated and the entire painted surface area will **not** be removed, then the surfaces at the location of any cutting or size reduction activities must be scraped clean to avoid any release of contaminants.
- **Walk in hood, Room 167** — 11 quads: inside bottom at drain, inside door, ceiling and walls outside top, each door, and walls. Inside should have paint removed prior to swiping and subsequent size reducing cutting activities. The waste stream generated from the paint removal will be drummed and randomly sampled for STLC metals and bulk radioactivity. Any liquids will be transferred to Building 514 for treatment and disposal. If the paint is found to be contaminated and the entire painted surface area will **not** be removed, then the surfaces at the location of any cutting or size reduction activities must be scraped clean to avoid any release of contaminants.
- **Asbestos pipes** — One quad per 10-ft length or isolated section. Remove using standard asbestos-removal techniques.

- **Electrical and safety fixtures** — Wash down surface; then, one quad per electrical cabinet and one equivalent quad area for each piece of safety equipment.
- **Floor tiles (asbestos), Room 155, 900 ft<sup>2</sup> (30 ft x 30 ft : 46 x 46 quads)** — With a quad area of 0.44 ft<sup>2</sup>, the sample population is about 2116 possible quad locations. Sample any stained areas on each side and under any pieces of equipment. In addition to metals and radiological analysis, bulk scrapings will be analyzed for cyanide. After taking the swipe sample, remove an entire tile and place in a plastic bag for analysis. Taking the larger of either the cube root of the population or the SW-846 frequency calculation value, 13 additional randomly chosen quads will be selected in this case. The entire floor can then be removed by standard asbestos removal techniques and containerized without further sampling.
- **Floor, Room 124, 1800 ft<sup>2</sup> (30 ft x 60 ft : 46 x 91 quads)** — With a quad area of 0.44 ft<sup>2</sup>, the sample population is about 4186 possible quad locations. Prior to sampling, remove paint coating from floor and containerize for further characterization sampling. The containerized waste will be sampled for STLC and radiological contaminants. If floor will not be stripped, sample any stained areas on each side, on the front, and under any pieces of equipment followed by the 16 randomly chosen quads. The number of quads was selected by taking the larger of either the cube root of the population or the SW-846 frequency calculation value.
- **Ceiling, Room 124, 1800 ft<sup>2</sup> (30 ft x 60 ft : 46 x 91 quads)** — With a quad area of 0.44 ft<sup>2</sup>, the sample population is about 4186 possible quad locations. Taking the larger of either the cube root of the population or the SW-846 frequency calculation value, 16 randomly chosen quads will be selected in this case. If ceiling will not be removed, sample any stained areas, plus the 16 randomly chosen quads.
- **Ceiling, Room 155, 900 ft<sup>2</sup> (30 ft x 30 ft : 46 x 46 quads)** — This ceiling and its fixtures were recently installed and should be clean. With a quad area of 0.44 ft<sup>2</sup>, the sample population has about 2116 possible quad locations. Taking the larger of either the cube root of the population or the SW-846 frequency calculation value, 13 randomly chosen quads will be selected in this case. Due to random selection, some quads may have fixture/ceiling tile combination overlaps; in these cases ignore changes in plane during swiping.
- **Ceiling, Room 167, 600 ft<sup>2</sup> (20 ft x 30 ft : 31 x 46 quads)** — This ceiling and its fixtures should be clean. With a quad area of 0.44 ft<sup>2</sup>, the sample population is about 1564 possible quad locations. Taking the larger of either the cube root of the population or the SW-846 frequency calculation value, 11 randomly chosen quads will be selected in this case. Due to random selection, some quads may have fixture/ceiling tile combination overlaps; in these cases ignore changes in plane during swiping.
- **Floor, Room 167, 600 ft<sup>2</sup> (20 ft x 30 ft : 31 x 46 quads)** — With a quad area of 0.44 ft<sup>2</sup>, the sample population is about 800 possible quad locations. Prior to sampling, remove paint coating from floor and containerize for further characterization sampling. The containerized waste will be sampled for STLC and radiological contaminants. If floor will not be stripped, sample any stained areas on each side, on the front, and under any pieces of equipment followed by the 11 randomly chosen quads. The number of

quads was selected by taking the larger of either the cube root of the population or the SW-846 frequency calculation value. In addition to metals and radiological analysis, bulk scrapings will be analyzed for cyanide.

- **Walls, Room 124, 30 ft x 60 ft x 20 ft** — This equates to two 600-ft<sup>2</sup> (30 ft x 20 ft : 46 x 31 quads) and two 1200-ft<sup>2</sup> (60 ft x 20 ft : 91 x 31 quads) walls. With a quad area of 0.44 ft<sup>2</sup>, the sample populations are 1426 (30-ft wall) and 2821 (60-ft wall) possible quad locations. Sample any stained areas on each side and behind any pieces of equipment. Taking the larger of either the cube root of the population or the SW-846 frequency calculation value, 11 and 14 additional randomly chosen quads respectively will be selected in this case.
- **Walls, Room 155, 30 ft x 30 ft x 10 ft** — This equates to four 300-ft<sup>2</sup> walls (30 x 15 ft : 31 x 23 quads). With a quad area of 0.44 ft<sup>2</sup>, the sample populations are 1058 (for each wall) possible quad locations. Sample any stained areas on each side and behind any pieces of equipment. Taking the larger of either the cube root of the population or the SW-846 frequency calculation value, 9 additional randomly chosen quads respectively will be selected for each wall in this case.
- **Walls, Room 167, 20 ft x 30 ft x 15 ft** — This equates to two 300-ft<sup>2</sup> (20 ft x 10 ft : 46 x 15 quads) and two 450-ft<sup>2</sup> walls (30 ft x 15 ft : 46 x 23 quads). With a quad area of 0.44 ft<sup>2</sup>, the sample populations are 713 (20-ft wall) and 690 (30-ft wall) possible quad locations. Sample any stained areas on each side and behind any pieces of equipment. Taking the larger of either the cube root of the population or the SW-846 frequency calculation value, 9 and 10 additional randomly chosen quads respectively will be selected per wall in this case.
- **Piping system** — Sampling of the piping system will be addressed by the Tanks Assessment Group in the Operations and Regulatory Affairs Division.
- **Roof structure, asphalt, 3500 ft<sup>2</sup>** — Sample scrapings of the roof will be randomly taken. With a quad area of 0.44 ft<sup>2</sup>, the sample population is about 8000 possible quad locations. The roof asphalt is expected to be clean, so the frequency of the samples will be the cube root of the population; 20 randomly chosen quads will be selected in this case.
- **Roof structure, HEPA filters** (see Figure 2-3 for a schematic of HEPA filter locations) — The HEPA filters will be the last item removed to allow scrubbing during any operations during the D&D. The HEPAs will be removed, bagged, and sampled according to EAS-App 301/1, Sampling of HEPA Filters.

**ATTACHMENT 1**

**SAMPLING AND ANALYSIS**

**SPREADSHEET SUMMARY**



Excel: B419closure

11-Aug-94

Draft outline of actions requiring closure work

**Building 419****Sampling and Analysis Summary**

Equipment or waste	Suspected contaminants Hazardous      Radioactivity	Method of Cleaning	Proposed Disposition	Performance Standards	Closure activities	
Clean Equipment at B419						
Ultrasonic cleaners (2) room 124	clean	clean	Wipe clean soap&water	Scrap or salvage	TTLC, swipe Rad, swipe	
Parts washer room 124	clean	clean	Wipe clean soap&water	Scrap	TTLC, swipe Rad, swipe	
8 foot hood room 155	Solidification residue	$\alpha$ , $\beta$ , H-3	Wipe clean soap&water	Ship to B513 reuse	Move to B513 swipe	Double bag ship to B513 for reuse
Bake out oven room 124	clean	$\alpha$ , $\beta$ , H-3	wipe clean soap & water	Salvage or scrap	TTLC, STLC, swipe Rad, swipe	
Sink room 155	Clean	Clean	Wipe clean soap&water	Scrap	TTLC, Swipe Rad, swipe	
Contaminated Equipment at B419						
Six foot hood room 155	metals &Hg	$\alpha$ , $\beta$ , H-3	Wipe clean soap&water	LLW or Scrap Work surface MW	TTLC, swipe Rad, swipe	Dismantle and put in box, work surface will probably be MW
Six foot hood room 155	metals &Hg	$\alpha$ , $\beta$ , H-3	Wipe clean soap&water	LLW or Scrap Work surface MW	TTLC, swipe Rad, swipe	Dismantle and put in box, work surface will probably be MW
Electropolisher room 124	metals	$\alpha$ , $\beta$ , H-3 high rad	No cleaning	Store Mixed	TTLC, STLC, swipe Rad, swipe	
Vapor degreaser room 167	freon TF, FOO1 methyl chloroform	$\alpha$ , $\beta$ , H-3	Acid wash	Ship as Haz	TTLC, swipe Rad, swipe	Store as MW
Bake out oven room 155	metals &Hg	$\alpha$ , $\beta$ , H-3	No cleaning	Store as MW	TTLC, Swipe Rad, swipe	Store as MW
Vapor blaster room 155	metals	$\alpha$ , $\beta$ , H-3	Wet down residue & Clean with soap & water	LLW or MW	TTLC, STLC bulk Radiological, bulk	Bag ship to B612 pending swipe results
Safe room 155		$\alpha$ , $\beta$ , H-3	Wipe clean soap&water	LLW or Scrap	TTLC, Swipe Rad, swipe	
Contaminated building structures and debris						
Walk in hood room 124	metals &Hg	$\alpha$ , $\beta$ , H-3 Alpha in paint	Wipe clean soap&water	LLW or Scrap	TTLC, STLC, swipe Rad, swipe	Remove paint using applicable Decon, Cut, Disassemble, put into a box
Walk in hood room 167	metals &Hg	$\alpha$ , $\beta$ , H-3	Wipe clean soap&water	LLW	TTLC, STLC, swipe Rad, swipe	Remove paint using applicable Decon, Cut, Disassemble, put into a box

Asbestos pipes	Asbestos	$\alpha$ , $\beta$ , H-3	Remove wet	LLW	TLC, STLC bulk swip Rad swipe, asbestos	Need licenced asbestos contractor Remove wet.
Electric fixtures, all rooms		$\alpha$ , $\beta$ , H-3	Wipe clean soap&water	Scrap or salvage	TTLC, Swipe Rad, swipe	
Floor tiles, asbestos room 155	metals &Hg	$\alpha$ , $\beta$ , H-3	Remove	LLW or Scrap	TTLC, STLC, swipe Radiological, bulk	Spot samples, sample stains
Ceiling tiles room 155		$\alpha$ , $\beta$ , H-3	Wipe clean soap&water	Reuse	TTLC, STLC Radiological & swipes	Sample, reuse, recently installed
Paint all rooms	metals &Hg	$\alpha$ , $\beta$ , H-3	Wipe clean soap&water	LLW or Scrap	TTLC, STLC, swipe Rad, swipe	Chip paint, analyze and possible reuse West wall contaminated areas removed
Walls (wall Board) room 155	metals &Hg	$\alpha$ , $\beta$ , H-3	Wipe clean soap&water	LLW or Scrap	TTLC, STLC, swipe Rad, swipe	Chip and core wall board
Piping system from drains in B419						
Floor concrete all rooms	metals &Hg	$\alpha$ , $\beta$ , H-3	None	LLW or Scrap	TTLC, STLC, swipe Rad	Core or remove section of floor
Floor drains all rooms	metals &Hg	$\alpha$ , $\beta$ , H-3	None	LLW or Scrap	TTLC, STLC, swipe Rad	Core or remove section of floor, cut pipe into sections
Soil beneath building all rooms	metals &Hg solvents	$\alpha$ , $\beta$ , H-3	None	LLW or Scrap	TTLC, STLC Radiological, bulk	Core
Roof and support structure at B419						
Roof structure (asphalt, foam) all rooms	Hg	$\alpha$ , $\beta$ , H-3		Scrap	TTLC, STLC Radiological, bulk	Chip and core
HEPA filters+ducts all rooms	Metals, Hg	$\alpha$ , $\beta$ , H-3	None	LLW or Scrap	TTLC, STLC	Core and analyze
Safety Equipment Showers, fire extinguishers, phones all rooms	Clean	Clean	Wipe clean soap & water	Reuse	TTLC, Swipe Rad, swipe	Remove as last items



## **APPENDIX B**

# **Health and Safety Plan for the Building 419 Size Reduction Unit and Solidification Unit Closure**



## Review and Approval

This Health and Safety Plan (Operational Safety Procedure 419.15) was reviewed by:

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Responsible Individual: Jay Morris

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Facility Manager: William T. Fritts

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ES&H Team 4 Leader: S. L. Carr

This Health and Safety Plan (Operational Safety Procedure 419.15) is approved by:

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HWM Division Leader: Keith V. Gilbert

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## **Health and Safety Plan for the Building 419 Size Reduction Unit and Solidification Unit Closure**

### **I. Overview, Organizational Structure, and Work Plan**

Title 29 Code of Federal Regulations (CFR) 1910.120 states that safety and health programs developed and implemented to meet other federal, state, or local regulations are considered acceptable in meeting the requirements of 1910.120. The Lawrence Livermore National Laboratory (LLNL) *Health & Safety Manual* (specifically Chapter 2) establishes a written program to identify, evaluate, and control safety and health hazards and provide for emergency response for all LLNL-authorized operations, including hazardous waste operations. The *Health & Safety Manual* addresses implementation of and compliance with Department of Energy (DOE) Orders and applicable federal, state, and local regulations. The LLNL Part B Permit Application documents the organization structure for LLNL's Hazardous Waste Management Division (HWM). In Section II of this Health and Safety Plan, a Site-Specific Health and Safety Plan is presented to address concerns specific to Building 419 Closure and thereby minimize risks to workers, the environment, and the public during the activities of this closure project. Finally, Attachment 3 summarizes the closure-specific Emergency Response Plan.

As required by 29 CFR 1910.120, Section A.9, Disposal or Decontamination of Equipment, Structures, and Soils, of the *Closure Plan for the Building 419 Size Reduction Unit and Solidification Unit* presents a comprehensive work plan for Building 419 closure activities.

### **II. Site-Specific Health and Safety Plan**

#### **A. Reason for Issue**

This Site-Specific Health and Safety Plan (SSH&SP) for the closure of Building 419 Solidification and Size Reduction Units documents the prejob safety planning and provides guidance for the safe and effective implementation of the closure activities. This plan establishes methods and an organizational structure to anticipate, recognize, and evaluate health hazards and recommends methods of control so that closure activities may proceed with minimum risk to workers, the public and the environment.

This SSH&SP has been prepared as a stand-alone document in compliance with 29 CFR 1910.120, applicable DOE Orders, and the current Chapter 2 of the LLNL *Health & Safety Manual*. It covers activities associated with closure of Building 419 under interim status. Specific activities will include sampling, decontamination, size reduction, and packaging and removal of hazardous and mixed waste treatment units. It is anticipated that various methods will be used to clean up and decontaminate the equipment, portions of the floors, walls, hoods' and ovens' exhaust duct work, ceiling, and roof of Building 419. In addition, since it is difficult to anticipate all possible activities, general methods for the recognition, evaluation, and control of potential hazards that may result from additional work tasks are outlined.

The location of closure activities will be in Rooms 124, 155, and 167, the mechanical room (hood and oven exhaust ducting) and the roof (hood and oven exhaust ducting and HEPA filters) of Building 419.

Retention tank removal, trenching, and asbestos removal operations shall be covered under separate SSH&SPs.

This SSH&SP covers the procedures to be followed to protect personnel and the environment during closure of the Building 419 Size Reduction and Solidification Units. This SSH&SP has been written for implementation by LLNL personnel and supplemental labor. If outside contractors are brought in to perform this work, each contractor is responsible for developing all relevant and required documentation and for providing workplace controls to reduce the risk to workers, by-standers, and the environment.

Any changes in operations that improve or do not significantly affect safety and environmental controls may be approved by the authorizing individual for this SSH&SP and the Environmental Safety and Health (ES&H) Team 4 Leader. The responsible individual shall ensure that this action is documented in a memorandum. Any changes in operations that increase the hazard level, introduce additional hazards, or decrease safety shall not be made until a revision of or a supplement to this SSH&SP has been reviewed and approved consistent with the review and approval process for this original SSH&SP. Before starting operations, the Documents and Assessments Group Leader (with the assistance of the Support Services Supervisor and the EAS Group Leader) shall verify and document (via Attachment 1: The SSH&SP Review Sheet) that hands on closure personnel have read and understand this SSH&SP and applicable sections of the LLNL *Health & Safety Manual*.

## **B. Key Personnel and Responsibilities**

The key personnel for the closure of the Building 419 Solidification and Size Reduction Units are 1) Facility Manager, 2) the Support Services Supervisor, 3) the Documents and Assessments Group Leader, 4) the Operations Technician Supervisor, and 5) the Environmental Analytical Sciences Group Leader.

The **Facility Manager** has overall project management responsibilities. He/she will oversee schedule and staff during the course of the closure project. For this project, the Documents and Assessments Group Leader, the Support Services Supervisor, and the ES&H Team Leader will advise and support the Facility Manager. The Facility Manager (or his designee) is responsible for the safety of this operation and for assuring that all work is performed in accordance with this SSH&SP and applicable sections of the LLNL *Health & Safety Manual* and the *Environmental Protection Handbook*. In the absence of the Facility Manager, the **Support Services Supervisor** shall assume these responsibilities.

The goals and responsibilities of the **Operations Technician Supervisor** under this plan are to advise the Facility Manager and Support Services Supervisor on all aspects of health and safety on site and to stop work if any operation threatens worker health and safety, the environment, or

public health. To accomplish the above goals, the Operations Technician Supervisor, with guidance and support from the ES&H Team:

- Enforces compliance with the SSH&SP for personnel entering the unit.
- Coordinates environmental, safety, and health program activities with the appropriate Environmental Safety and Health disciplines, Environmental Analytical Sciences personnel, and upper management. Provides 24 hour pre-job notification, (including detailed description of the task, location, equipment to be used, methods to be used and name and employee number of personnel assigned to the task) to the Industrial Hygienist and the Health Physicist, or the Health and Safety Technologist.
- In consultation with the ES&H Team, changes the work zone boundaries, enforces level of personal protection, and initiates changes to this SSH&SP, as necessary.
- Conducts safety meetings.
- Establishes access control points through which only closure personnel and escorted visitors shall enter the work area; personnel not participating in closure activities shall not enter the Exclusion Zone without being escorted by the authorized personnel. Enforces the use of an entry and exit log book to document the presence of individuals in the facility.
- Controls entry and exit at the access control points and provides escorts for all visitors.
- Mandates proper use, storage, and maintenance of protective clothing and equipment for each closure activity.
- Monitors on-site hazards and conditions and inspects periodically the protective clothing, equipment, and closure activities in progress to ensure that this SSH&SP is adequate and is being followed.
- Ensures that the work area is clean and orderly.
- Orders an immediate evacuation of the work area, if necessary.
- Knows emergency procedures evacuation routes and relevant telephone contacts.
- Enforces the buddy system.
- Publishes and distributes (internally) a list of Closure Project personnel with this document. This list shall include each person's name, title, telephone number, pager number (if applicable), and L-code. Posts the list in the Support Zone next to each phone in Building 419. Updates the list as necessary whenever personnel or numbers change.
- Obtains information and assistance as needed from ES&H Team 4 personnel assigned to this activity.

The **Documents and Assessment Group Leader** is responsible for assuring the creation and proper maintenance of all required regulatory ES&H documentation. Documents and Assessments Group Leader:

- Plans, documents, coordinates, and reviews the closure of Building 419 in accordance with the State of California Department of Toxic Substances Control.
- Verifies and documents that all closure personnel have read and understand this SSH&SP.

The **Environmental Analytical Sciences Group** (EAS) shall carry out the day-to-day sampling and analysis work in accordance with the sampling plan for the determination of proper disposition for each container of waste to be packaged and removed.

**ES&H Team 4** members shall provide environmental health and safety support via routine walk-through, hazard evaluations, monitoring, and guidance to the Facility Manager, Operations Technician Supervisor, and Support Services Supervisor.

- The ES&H Team, specifies and requests monitoring procedures, evaluates monitoring results, and recommends changes to work zone boundaries, level of personal protection, and this SSH&SP, as necessary.
- Monitors on-site hazards and conditions and inspects periodically the protective clothing, equipment, and closure activities in progress to ensure that this SSH&SP is adequate and is being followed.

The **Operations Technicians** are responsible for reading and following this SSH&SP and notifying their Supervisor of any unsafe conditions, injuries, accidents or property damage. In addition the Operations Technicians shall:

- Keep the work area clean and orderly.
- Call 911 and isolate the affected area in the event of an emergency.
- Know the location of emergency exit routes and assembly area for the 419 Facility.
- Work in accordance with the Buddy System (two person rule for all decontamination activities).
- Report unsafe conditions to their supervisor.

The Health and Safety Technician's responsibilities are documented in the Team Action Plan for Hazardous Waste Management.

Additional personnel may include members of the Hazards Control Safety Labs Division for Hazards Control sample analysis, the Emergency Services Department, Health Services, and Hazards Control Respirator Services, as needed.

Figure 1 presents the organizational structure for this closure project.

**General LLNL Policies and Controls**—The policies set forth in this SSH&SP as well as LLNL and DOE policies, procedures, and instructions govern actions taken by employees and contractors to protect human health and the environment during closure activities. Of special importance are the LLNL *Health & Safety Manual* and support provided by the LLNL ES&H Team. Personnel working on the project shall be familiar with the LLNL *Health & Safety Manual*. The Support Services Supervisor and the Operations Technician Supervisor shall arrange for necessary support from the ES&H Team.

This SSH&SP, the LLNL *Health & Safety Manual*, applicable Supplements to the *Health & Safety Manual*, applicable DOE Orders, applicable closure plans, the Sampling and Analysis Plan for Building 419 Closure, standard operating procedures, and all applicable training records shall be made available for review and use by the Operations Technician Supervisor, regulatory agencies, and all project personnel.

## **C. Site Characterization and Hazard Assessment**

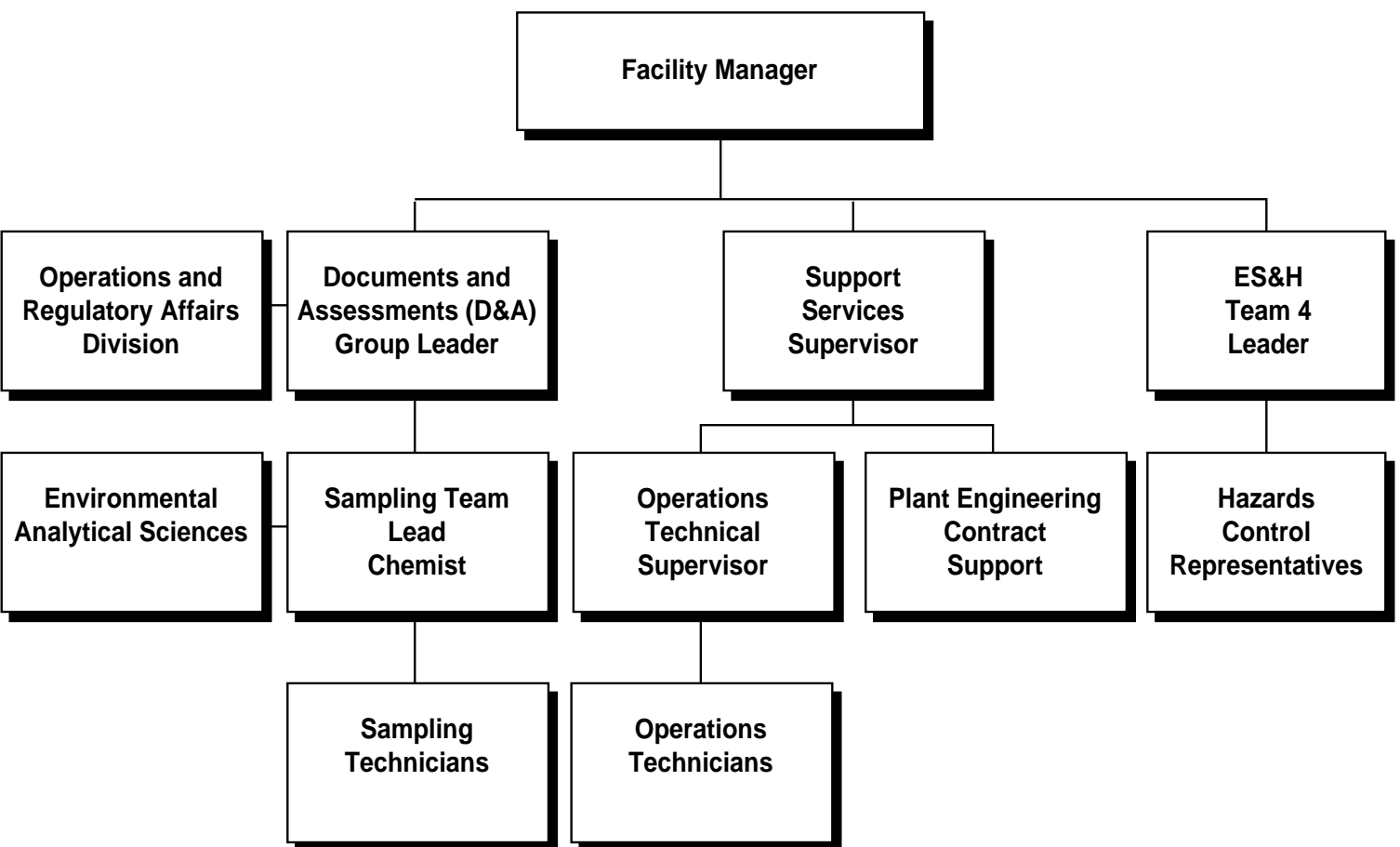
The following hazard assessments address the hazardous or radioactive materials and other hazards associated with the work to be done during closure activities. This 7,860-ft<sup>2</sup> facility has been used for various purposes in the past, such as airplane maintenance, a health chemistry laboratory, and equipment decontamination and size reduction. The hazards posed by cleanup and removal of potential residues of these previous activities are discussed in the following sections.

### **C.1 General Safety Hazards**

Potential hazards to bystanders or the public are the unlikely potential for exposure to airborne contaminants from work activities and the physical hazards of container movement. Working alone and in isolation from Lab-wide notification systems can present additional risk of injuries in the event of a spill, fire, earthquake, or personal trauma. Inadvertent release of hazardous or radioactive materials could cause illness or injury to individuals on site or off site.

### **C.2 Industrial Hygiene Hazards**

The industrial hygiene concerns related to the Building 419 closure activities have been identified from existing knowledge of the waste management units, results of swipe sampling (see Attachment 1, Sampling and Analysis Spreadsheet Summary, to Appendix A, Sampling and Analysis Plan, of this closure plan), area conditions, anticipated work tasks, and knowledge of prior activities in the area. Proposed closure activities may present potential hazards discussed herein to site personnel in the event that controls fail or human errors occur. If any unforeseen hazards occur or the scope of work changes, the Operations Technician Supervisor and the ES&H Team Leader shall be informed immediately so that an evaluation may be performed and appropriate actions may be taken, so that work may resume safely. A written Hazard Assessment (HA) (see Attachment 2) shall be prepared for all tasks to evaluate and control potential hazards specific to these closure activities.



**Figure 1. Organization Chart and Reporting Diagram**

Tasks that may result in chemical exposures at greater than one tenth of the allowable and applicable limits shall have written HA.

The potential industrial hygiene related hazards associated with the sampling, analysis, decontamination, and packaging of the Building 419 Solidification and Size Reduction Units under closure include ingestion, inhalation, injection, or absorption of toxic or corrosive dispersible residues such as:

- Ammonia
- Beryllium
- Copper
- Chromium
- Nickel
- Cadmium
- Mercury
- Lead
- Zinc
- Oxidizers
- Cyanide residues
- Arsenic
- Cobalt
- Silver
- Acids and bases
- Oil and grease
- Silica dust
- Solvents
- Asbestos
- Burns from ignition or contact with flammables and combustibles or potentially incompatible chemicals.

These toxic or corrosive materials are anticipated to present a potential hazard in the event that large or concentrated areas of dispersible materials are discovered within the nooks and crannies inside pieces of equipment. Tasks such as surface coating removal (in the walk-in hoods) and cutting tasks on other large pieces of equipment that may require size reduction may potentially generate hazardous concentrations of airborne materials. Table 1 summarizes the types of tasks, equipment by room number, the hazard analysis, and the decontamination methods and controls for this closure project. Detailed equipment-specific and task-specific information is referenced to the appropriate Hazard Assessment form (HA#). These HA forms (in Attachment 2) contain operation descriptions, hazard evaluations, monitoring requirements, control methods, and personal protective equipment (PPE) requirements. In addition, in some cases, the detergents and cleaning agents may present personnel injury hazards via all routes of exposure if not properly controlled.

**Table 1. Equipment, Hazards, and Methods Of Decontamination**

Room Number/ Decontamination Methods/ Equipment To Be Decontaminated	Potential Hazards Analysis Based on 1) User Knowledge and 2) Swipe Results to Date	Controls
Room 124:  Wet wipe to clean two ultrasonic cleaners, parts washer, Room 124 mercury bake-out oven, sink, and safe.	Bake-out oven may have slight mercury, alpha, beta, or tritium contamination. Standard industrial hazards: pinch points, mass in motion, cumulative trauma, overexertion. IH and HP hazards: inhalation, ingestion, injection or skin absorption of mercury, or tritium.	Use wet methods. Wet wipe; water and trisodium phosphate. Control via use of good ergonomics. See D.4. Cleanup spills immediately. See HA#1
Room 124:  Wet-wipe surface cleaning, hood disassembly, and paint removal by hand using a brush.  Walk-in hood	Used for hydrolyzing sodium potassium (NaK), HF neutralization, removing beryllium and cadmium from parts; and steam cleaning equipment. Toxic metals, specifically mercury, cadmium, and beryllium, have been leached from the floor. Low levels of contaminants (radioactive and toxic) potentially covered over with paint and various surface coatings.	Use half-mask HEPA-filtered respirators may be necessary to prevent the potential for exceeding the OSHA ceiling for beryllium and (highly unlikely) the 8-hour American Conference of Governmental Industrial Hygienists' Time-Weighted Average Threshold Limit Value (ACGIH TLV-TWA) for other chemicals and DOE limits for radionuclides. See HA#2 A and B.
Room 124, 155, 167:  Cutting with a torch or saw.  Walk-in hoods	Coatings may contain potentially hazardous quantities of beryllium, cadmium, mercury, lead, zinc and radionuclides. Hazardous exposures may occur if paint is dispersed into the air during removal (for example due to poor or incomplete paint /residual removal).	Use hood ventilation to reduce exposure to ozone, metals, fluorides. Wear welding hood, thermally protective clothing and gloves, safety shoes, and respirator. Remove surface coating before cutting. See HA#3.
Room 124: Outside surface wet-wipe cleaning only. Seal in an air-tight manner; package and remove as mixed waste.  Vapor Blaster and Electropolisher	Potentially contaminated with respirable toxic metals.	Provide secondary containment. Handle carefully—the vapor blaster is corroded and integrity is questionable. Provide secondary containment at all times. Use wet methods See HA#4.

Continued

**Table 1. Equipment, Hazards, and Methods Of Decontamination (continued)**

Room Number/ Decontamination Methods/ Equipment To Be Decontaminated	Potential Hazards Analysis Based on 1) User Knowledge and 2) Swipe Results to Date	Controls
Room 124, 155, 167: Chipping, coring, cleaning, and swiping of building surfaces	Potential exposure to toxic metals, radioactive contaminants, silica in concrete flooring, asbestos in thermal insulation on piping and wall board mud. Recheck ceilings for asbestos before producing friable materials. The Support Services Supervisor shall assign an Asbestos Trained Sampling Tech for sampling all suspected asbestos containing materials (ACM).	Wet methods shall be used to minimize the production of airborne dusts, and aerosols. Treat ceiling as asbestos-containing material (ACM) until verified non-asbestos. Wall coating and mud between Rooms 155 and 167; thermal insulation on piping in 124; tile floor in Room 155 are all ACM. Safe may be lined with ACM. See HA#5.
Room 155: Wet-wipe, disassemble, double bag and relocate sink and 8-ft hood on site. Box 6-ft hood and safe for disposal. 8-ft solidification hood and 6-ft hood.	Potential for toxic metals (mercury, solidification metals, beryllium), alpha, beta, and tritium. Sink and safe are believed to be clean.	If cutting is necessary, use same controls as for Room 124 hood. Verify that safe does not have potential asbestos lining before disposition. See HA#1, HA# 2 and HA#3.
Room 155: Disassembly of Bake-out oven	Potential for exposures to toxic metals, especially mercury. Also, alpha, beta, and tritium possible. See Sections C.3 ,C.4 and D.3, D.4 for Health Physics and Industrial Safety discussion.	No cleaning without an additional task-specific HA; highly contaminated. Use wet methods during disassembly to reduce dispersion; avoid cutting or creating dusts, fumes, or aerosols. Wear combination mercury-absorbing and HEPA filter cartridges. See HA#6
Room 155: Wet and wash down pump out slurry and package per Environmental. Analyst. Vapor Blaster and Electropolisher	Potential for exposure to toxic metals (see Section C.3, C.4 and D.3, D.4 for discussion of radioactive contaminants and industrial safety hazards and controls). Vapor blaster still contains contaminated blaster residue, which is now a dry, highly dispersible slurry.	Clean with wet-wipe and wash down methods. Pump out water based slurry and package separately. During disassembly, keep surfaces and residues wet. See HA#4.

Continued

**Table 1. Equipment, Hazards, and Methods Of Decontamination (continued)**

Room Number/ Decontamination Methods/ Equipment To Be Decontaminated	Potential Hazards Analysis Based on 1) User Knowledge and 2) Swipe Results to Date	Controls
Sampling asbestos floor tiles Room 155; Sampling thermal insulation on piping Room 124. Sampling ceiling Room 155. Sampling wall between Room 155 and 167.	Sampling may produce airborne asbestos dust, plus potential for hazardous exposure levels of mercury, beryllium, cadmium, uranium, and other metals. Thermal burns if piping is hot. Potential for alpha, beta, and tritium exposures via inhalation, ingestion, and skin contact. (See Sections C.3, C.4, D.3, and D.4.)	Sampling Asbestos containing materials requires special training. The LLNL Asbestos Sampling Tech Shall perform this work. HA#5 covers sampling work.
Removal of toxic metal/tritium contaminated asbestos floor tiles, if required.	Removal may produce airborne asbestos dust, plus potential for hazardous exposure levels of mercury, beryllium, cadmium, uranium, and other metals. Asbestos is a known human carcinogen. Beryllium, cadmium, uranium are suspect human carcinogens. Potential for alpha, beta, tritium, metals and asbestos exposures via inhalation, ingestion, and skin contact. (For radiation and industrial safety hazards see Sections C.3, C.4, D.3, and D.4.)	Remove with in-house asbestos-qualified workers. After vapor blaster and other contaminated equipment is removed, a separate Hazard Assessment shall be required: coordination and approval of applicable ES&H Team disciplines (e.g., Environmental Analyst, Industrial Hygienist, Health Physicist, Industrial Safety Engineer), and Health and Safety Technician, the Operations Technician Supervisor, and Support Services Supervisor shall be documented.
Room 155:  Removal of paint (chip, core, scrape, wet-wash, steam clean) and surface coating materials—wall board, ceilings for contamination removal or sampling purposes.	Potential for inhalation and ingestion exposures to toxic metals including mercury, lead, cadmium, zinc. Potential for alpha, beta, and tritium exposures via inhalation, ingestion, and skin contact. (See Sections C.3, C.4, D.3, and D.4.)	Use wet methods and adequate close capture HEPA ventilation. Air monitoring may be required per the Hazard Assessment, HA#7. Use lock-out tag-out measures for electrical panel/ electrical fixture work.

Continued

**Table 1. Equipment, Hazards, and Methods Of Decontamination (continued)**

Room Number/ Decontamination Methods/ Equipment To Be Decontaminated	Potential Hazards Analysis Based on 1) User Knowledge and 2) Swipe Results to Date	Controls
Room 167:  Decontamination of vapor degreaser. Use wet methods and hand tools. Disassemble, package, and remove.  Partswasher and Vapor Degreaser	May have traces of radioactive contaminants and halogenated hydrocarbons in sludge. Potential for alpha, beta, and tritium exposures via inhalation, ingestion, and skin contact. Low potential for halogenated hydrocarbon contact. (See Sections C.3, C.4, D.3, and D.4.) Paint over radionuclides.	Follow requirements in the Hazard Assessment, HA#8.
Room 167:  Cutting disassembly boxing  Walk-in hood	Potential for hazardous exposures to toxic metals, including mercury. Potential for alpha, beta, and tritium exposures via inhalation, ingestion, and skin contact.(See Sections C.3, C.4, D.3, and D.4.)	Follow requirements in Hazard Assessment, HA#3. Remove paint before cutting, disassembly, and boxing.
All rooms:  Concrete coring	Silica dust and toxic metals, tritium, alpha, beta, gamma.	A separate Hazard Assessment shall be generated to provide adequate controls for all workers and by-standers. This HA shall be approved by the ES&H Team. Plant Engineering and additional individuals not previously addressed may be required for this work. Health Hazard Communication training for additional workers may be necessary depending on results of swipe and bulk sampling inside/outside the hoods.

Continued

**Table 1. Equipment, Hazards, and Methods Of Decontamination (continued)**

Room Number/ Decontamination Methods/ Equipment To Be Decontaminated	Potential Hazards Analysis Based on 1) User Knowledge and 2) Swipe Results to Date	Controls
Roof and Support Structure:  Cleanup, packaging, and removal of ventilation ducting and HEPA filters. Removal of roofing materials.	Potential overexposure to 1) asbestos in tar paper from roofing materials, 2) toxic metals (mercury, beryllium, cadmium, lead...) may have collected in dead spots in ducting and HEPAs, 3) fluorides in HF treatment hood, 4) potential for alpha, beta, and tritium exposures via inhalation, ingestion, injection and skin contact. (See Sections C.3, C.4, D.3, and D.4.)	A separate Hazard Assessment shall be generated to provide adequate controls for all workers and by-standers. Riggers and additional individuals not previously addressed may be required for this work. Health Hazard Communication training for additional workers may be necessary depending on results of swipe and bulk sampling inside/outside the hoods.
Decontamination and cleanup of safety equipment, showers, eye wash, fire extinguishers, phones.	Wet-wipe, swipe, and leave in place. (See Sections C.3, C.4, D.3, and D.4.)	Wear lab coat , safety shoes shoe covers, and disposable latex gloves (level D).

Other Industrial Hygiene hazards are as follows:

- **Chemical exposure:** Swipe sampling results to date indicate low levels of both dispersible and fixed chemical hazards. Examples of potential hazardous chemical contaminants associated with each piece of equipment are presented in Table 1. Chemical exposure (inhalation, ingestion, injection, or absorption) could occur during decontamination activities such as brushing, scraping, hydroblasting, sawing, cutting, or moving treatment units. Inhalation or ingestion of toxic or hazardous materials may occur during activities that may generate airborne dusts, mists, aerosols, fumes, vapors, or fibers. Skin contact may result in absorption of chemicals. Cuts from contaminated saw blades, sharp edges, or parts may create an injection hazard. Ingestion of hazardous materials is also a hazard if hand-to-mouth contact is not avoided during closure operations.
- **Noise:** High noise levels may result from machinery use. For example, mechanically moving waste containers, pumping waste, pressure washing or stripping surfaces, and, if needed, coring, jack hammering, or sawing to remove concrete surfaces and possibly large pieces of ducting and hoods.
- **Heat Stress:** The hazards due to heat stress can result from active tasks in which personnel are exposed to temperatures above 62°F while wearing full-body protective clothing.

### **C.3 Radiological Hazards**

The principal radiological hazard associated with the closure of Building 419 is the internal radiation dose, which may result from the inhalation, ingestion, injection, or absorption of radionuclides. The facility is known to have removable radioactive contamination on walls, floors, ceilings, and equipment. Tritium contamination is known to be present throughout much of the facility, especially within Room 155. Alpha- and beta-emitting radionuclides are also known to be present in much of the equipment and are suspected in other areas, such as walls, floors, and ceilings. The specific radionuclides present have not been fully characterized, although based on the documented activities that have taken place within the facility, the list is likely to include mixed fission products, uranium, and plutonium.

Uptakes of radioactivity may occur via inhalation, ingestion, or absorption/injection through the skin. Surface contamination can lead to uptakes via absorption through the skin, (particularly with tritium) or injection through the skin (a hazard when working around sharp metal edges or using metal scrapers), ingestion (hand-to-mouth transfer of activity), or through inhalation of resuspended radioactivity. Tritium does not present a radiological hazard unless it is taken into the body. Many of the other radioactive contaminants within the facility emit radiation capable of delivering external doses; however, surveys clearly indicate that the levels are too low to be significant. The potential for internal uptakes of removable surface contamination is the only radiological health hazard associated with this project.

The hazards presented by removable surface contamination may be examined by considering the dose that would result from the uptake (ingestion or inhalation, whichever results in the highest dose) of all of the activity on a 100 cm<sup>2</sup> reference (Ref.) surface area. The resulting doses are summarized in Table 2.

### **C.4 Industrial Safety Hazards**

Industrial safety hazards potentially posed by the Building 419 closure activities include the following sources of energy: electrical sources (capacitors, batteries, exposed conductors, static electricity, high voltage); motion sources (gears, belts, pinch points, vehicles, mass in motion); gravity-mass sources (falling objects, lighting, falling, tripping slipping, earthquakes); heat sources (steam, flames, friction, and ultraviolet light). Potential injuries such as strains, overexertion, burns, cuts, head trauma, repetitive motion, and electrical shock are potentially associated with wipe cleaning and steam cleaning, hydroblasting, paint stripping, jack hammering, and various other activities of the closure plan.

Heavy equipment that may be used includes pumps to remove decontamination solutions and forklifts to move containers of equipment, scrap, hazardous or mixed waste, building debris, and trash. Personnel not operating heavy equipment shall maintain a safe distance at all times. Forklifts are equipped with backup bells to alert personnel of reverse movements. All heavy equipment shall be operated in accordance with the *Health & Safety Manual*.

**Table 2. Radionuclide Potential Dose Summary**

Radionuclide	Level of Removable Surface Contamination (dpm/100 cm <sup>2</sup> )	Dose* Resulting from Uptake** of ALL Contamination on 100-cm <sup>2</sup> Ref. Surface (mrem)
Tritium	1,000	0.00003
	10,000	0.0003
	100,000	0.003
	1,000,000	0.03
Strontium 90 (simple fission product)	1,000	0.6
	10,000	6
	100,000	60
	1,000,000	600
Cesium 137 (simple fission product)	1,000	0.02
	10,000	0.2
	100,000	2
	1,000,000	20
Uranium 238	1,000	50
	10,000	500
	100,000	5,000
	1,000,000	50,000
Plutonium 239	1,000	200
	10,000	2,000
	100,000	20,000
	1,000,000	200,000

\* The reported dose equivalent is the Committed Effective Dose Equivalent.

\*\* The mode of uptake (e.g., ingestion or inhalation) used for these calculations was that which resulted in the highest resulting dose equivalent. The same is true for the chemical form and the particle sizes that were assumed.

## **D. Controls**

### **D.1. General Controls**

#### **D.1.1 Site Control Measures**

Access to the LLNL main site and the waste management areas is restricted to authorized personnel only, and all personnel must be badged. Visitors shall be badged and escorted at all times. Access within Building 419, beyond the Support Zone (defined below and see Figure 2), shall be restricted to Closure Project personnel and escorted visitors.

##### **D.1.1.1 Work Zones**

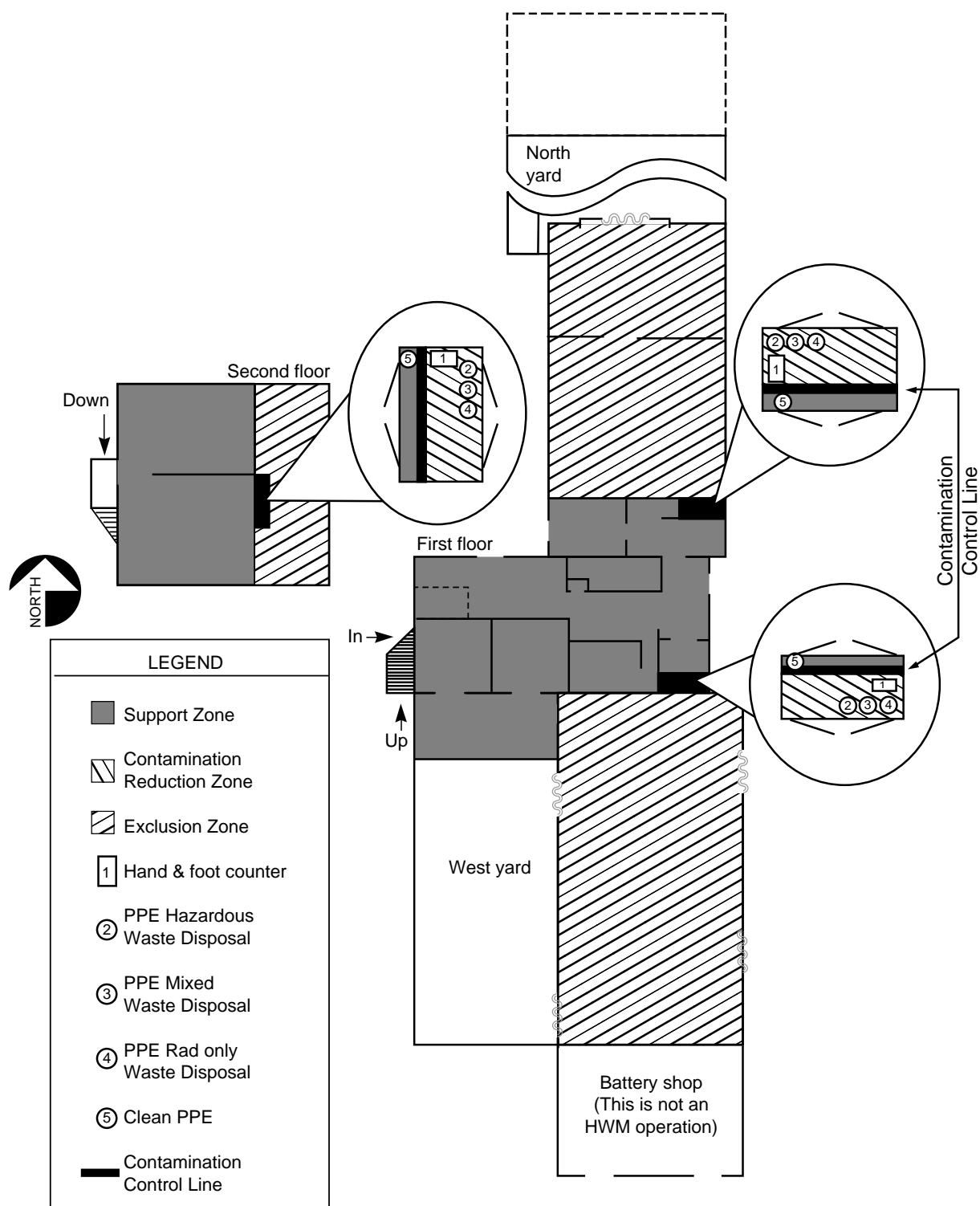
Access to the work areas during closure activities shall be controlled to reduce the possibility of entry by unauthorized or unprotected individuals and to prevent the transfer of contaminants by personnel or equipment from the waste management unit. Three zones (the Exclusion Zone, the Contamination Reduction Zone, and the Support Zone) are proposed in Figure 2, Building 419 Work Zones. Zone boundaries may be modified by the Operations Technician Supervisor or the Health and safety Technician depending upon changing work and site conditions. All exclusion zones should be kept as small as possible to prevent additional tracking of residues and to reduce the amount of hazardous or radioactive wastes generated. Zones will be entered and exited only at the designated access control points; exceptions for the movement of vehicles and forklifts shall be made only upon release by Hazards Control Health and Safety Technician. Entry and Exit Logbooks shall be maintained in the Support Zone to document the presence of all personnel in the closure exclusion zones.

- **Exclusion Zone**

The exclusion zone is the area where contamination may or does exist (e.g. Rooms 124, 155, and 167). Persons entering this zone shall be required to have appropriate health and safety training and to wear PPE as prescribed by the Operations Technician Supervisor. Level D is the minimum required level of protection (see Section D.3.2 and Table 4 below).

- **Contamination Reduction Zone**

All personnel and equipment decontamination activities shall occur in this zone. Personnel entering this zone shall be required to wear PPE as prescribed by the Hazard Assessment form for the task. Personnel shall doff used and potentially contaminated PPE in the contamination reduction zone before crossing the contamination control line. Personnel shall perform full body surveys for alpha/beta activity each time before leaving this zone and before crossing the Contamination Control Line. The Contamination Control Line is designated by a 2-inch-wide strip of yellow tape on the floor, demarcating the "booties/no booties" line. Call the Hazards Control ES&H Team 4 Technician (4-4731 or page on 3-7777-05446) if assistance is needed.



**Figure 2. Building 419 Work Zones**

Always call the Health and Safety Technician in the event that the hand-held meters indicate skin contamination; also contact the Operations Technician Supervisor or the Support Services Supervisor. Collect contaminated PPE as hazardous, radioactive, or mixed waste based on the proposed disposition of the piece of equipment handled during the work period. PPE waste shall be sampled per recommendations from the Environmental Analyst, after it is collected to determine disposition.

Decontamination is required for reusable PPE, (e.g., face shields) sampling and waste moving and monitoring equipment.

Decontamination of equipment shall be performed by steam cleaning or damp wiping. Waste water generated from decontamination procedures shall be contained and then drummed for later analysis. Waste disposition to on-site or off-site treatment or disposal shall be determined based on analytical results. Decontamination of equipment shall be conducted in a pre-planned manner to reduce waste generation. Equipment shall be stored inside or in a covered shelter to prevent contaminated rainfall run-off during the closure work. Monitoring equipment shall be immediately decontaminated or wrapped in plastic to reduce potential for contamination spread.

Once the actual hands-on decontamination and size reduction work begins, use of disposable booties over safety boots and use of disposable work suits shall be required. Specifications will be provided in the task specific Hazard Assessment.

- **Support Zone**

The Support Zone shall be the outermost zone and shall be maintained as a noncontaminated area. Any supplies or equipment that need not be or cannot be stored in potentially contaminated or hazardous areas, but are required to support closure activities, shall remain in this zone. Likewise, any work that need not or cannot be done in a potentially contaminated or hazardous area but is required to support closure activities may be done in this zone. The Support Zone shall be adjacent to the Contamination Reduction Zone and under a positive pressure with respect to the Exclusion Zone. Personnel shall don clean PPE in the Support Zone, normally in the area closest to the contamination control line.

#### **D.1.1.2 Buddy System**

All personnel conducting physical closure activities in the Building 419 Solidification and Size Reduction Units shall be required to work with a “buddy” and shall be prohibited from entering the area alone to handle waste materials or containers.

#### **D.1.1.3 Communications**

The Operations Technician Supervisor or his designee shall maintain contact with workers on a continual basis. A Support Zone sign-in and sign-out logbook shall be used as a documented checkpoint by the Operations Technician Supervisor. The buddy system is part of the communications system to be used for work at B-419. Loudspeakers are connected to the LLNL Emergency Notification System for sitewide notifications.

The Building 419 Emergency Response Plan (Appendix A) lists the emergency contacts and telephone numbers at LLNL and off site for this closure activity.

#### **D.1.1.4 Standard Operating Procedures**

The LLNL Standard Operating Procedures (SOPs) for the following activities shall be used to assure that closure activities meet all regulatory requirements. Task-Specific Hazard Assessments shall be developed for each SOP and each Task-Specific Hazard Assessment shall be reviewed and approved by ES&H Team 4.

- **Container Handling**

General safety practices for chemically compatible storage of drums and prudent practices for handling drums with forklifts, cranes, and other pieces of equipment are provided in the LLNL *Health & Safety Manual*, the Part B permit application, and the Facility Safety Procedure for Building 612 (FSP-612).

- **Hazardous, Radioactive, and Mixed Wastes**

These wastes shall be handled in accordance with FSP-612, the Safety Analysis Report for HWM, and any applicable Building 419 SOPs in place at the time of closure.

### **D.2 Industrial Hygiene Controls**

#### **D.2.1 Task-Specific Hazard Assessments**

Tasks currently identified as warranting Task-Specific Hazard Assessments include, but are not limited to, the tasks listed in Table 3, Closure Activities. Hazard Assessments are attached as Attachment 2. These Hazard Assessments will be carefully re-evaluated at least 24 hours before commencing any of the Specific Tasks; this reevaluation will allow for discussion of the latest sampling results and the use of any new technologies. This re-evaluation shall involve input from the individuals that will actually perform the work and from each of the safety disciplines.

The following practices shall be strictly observed at all times during the closure work, from the time of entry into the work site until exit from the site. These prohibited practices include:

**Table 3. Closure Activities**

Task Description	Equipment and Structures
1. Wet-wipe cleaning; soap and water	(Room 124) Ultrasonic cleaners, parts washer, 8-ft hood, bake-out oven, (Room 155) 6-ft hood, safe sink, (Room 167) walk-in hood, electric fixtures, piping debris, floor tiles, ceiling tiles, walls, concrete floor, ventilation ducting, HEPA filters, safety equipment. (HA#1)
2. Wet-wipe cleaning; nitric acid	A task-specific HA shall be written and approved by HC at least 24-hr before acid work begins. Do not use acid on cyanide residues or on incompatible electropolisher residues.
3. Dismantling	Hoods, vapor degreaser, bake-out ovens. (HA# 1, 2A and 2B)
4. Paint removal	Hoods, vapor blaster, vapor degreaser, bake-out ovens. (HA# 7)
5. Cutting/size reduction	Hoods, vapor degreaser, bake-out ovens. (HA# 3)
6. Use of TLC Stripable Paint to remove surface contamination	Hoods. A task-specific HA shall be written and approved by HC at least 24-hr before work begins.
7. Asbestos Containing Materials sampling tasks.	Sampling 9-inch floor tiles, thermal insulation, possible roofing materials, ceiling in Room 155, wall between 167 and 155. (See HA# 5)
8. Concrete coring, etching, jack hammering	Room 155 around vapor blaster/mercury bake out oven, solidification hoods. Room 124 and 167 around drains. A task-specific HA based on the most recent sampling results and any possible new technologies shall be written and approved by HC at least 24-hr before work begins.

- No eating, drinking, or chewing, in the Contamination reduction zones or the exclusion zones. No smoking in any Building on site. No hand-to-face contact when the clothing or the body may be contaminated. Any open wounds shall be covered with an air tight bandaged.
- No facial hair that may interfere with any required personal protective respiratory equipment.
- Protective clothing that is wetted with a hazardous or radioactive substance shall be immediately removed and the wearer shall proceed to the Contamination Reduction

Zone to remove any trace contaminants from the skin, survey the affected area, dispose of contaminated clothing thoroughly wash the affected area and don clean protective clothing.

- Unauthorized personnel shall not remove equipment, trash or clothing from the decontamination zone.
- Minimize all contact with contaminated surfaces, for example, kneeling or sitting on potentially contaminated surfaces.

Other conditions may be imposed as required by the Operations technician supervisor.

### **D.2.2 Heat Stress Prevention**

Heat stress hazards are not anticipated to occur frequently during closure of the Building 419 Solidification and Size Reduction Units. Should the ambient temperature exceed 62°F while personnel are required to wear full body PPE, the Industrial Hygienist shall specify and enforce rest periods based on results of wet bulb globe temperatures and the effort of work in accordance with the latest edition of the American Conference of Governmental Industrial Hygienists recommendations. Drinking water shall be available in the support area, and personnel shall doff PPE and take appropriate breaks in the support area when heat stress hazards so dictate. Breaks for heat stress control shall be required by the Operations Technician Supervisor with frequency guidance provided by the ES&H Team 4, Industrial Hygienist. Work requiring the use of full body protective clothing shall be scheduled for the cooler parts of the day when possible.

### **D.2.3 Selection and Use of Personal Protective Equipment**

Level D PPE (see Table 4) — including safety glasses or face shield, LLNL safety shoes or protective booties, LLNL lab coat or coveralls — and shall be worn at all times by personnel conducting hands-on work unless a higher level of protection is specified by the Hazard Assessment (HA) — (task-specific gloves shall be required for any potential hands-on work or chemical use). It is anticipated that higher levels of protection shall be required during active decontamination and size reduction activities. The Hazard Assessment and the active visual work site monitoring by the Operations Technician Supervisor and the ES&H Team 4 personnel as described in Section B of this SSH&SP shall determine whether the closure conditions or tasks have changed and require a higher level of protection. In addition, area and personnel monitoring for chemicals, radionuclides, heat stress should provide both real time and post exposure validation of the PPE controls. Table 4 lists the PPE that shall be available to all personnel conducting closure activities. Respirators may only be obtained after medical approval (Building 663) and fit testing (Building 324, extension 2-7910). Some of the equipment specified in Table 4 is for upgrade to Level C, should it become necessary.

The Operations Technician Supervisor shall require a written Task-Specific Hazard Assessment for those tasks that require the wearing of additional PPE above that listed for Level D in Table 4. When engineering controls are not available or may not provide adequate protection, respiratory protection shall be required if personnel exposures above the applicable Threshold Limit Values (TLVs) are anticipated, or if personnel so desire.

**Table 4. Required PPE**

Level D	Level C
Safety glasses or face shield	Level D plus
Lab coat or overalls	Task-specific respiratory protection
Safety shoes or protective booties/shoes covers	Impermeable suits and hoods
Gloves specified in the Hazard Assessment, if hands-on contact is to be made with equipment or building structures.	Double gloves taped to suit
	Full shoe covers taped to pants
	Hard hat
	Safety glasses or face shield
	Gloves (nitrile, polyamine, pylox, viton, surgical, leather). Task specific and equipment specific glove selection and other PPE requirements are provided in the Hazard Assessment in Attachment 2.

If activities require handling any surfaces or equipment, impermeable gloves are required. Specific guidance for glove use can be found in the relevant Equipment-Specific and Task-Specific Hazard Assessment.

#### **D.2.4 Noise**

The Industrial Hygienist shall monitor all suspected high noise operations, document the results, and recommend appropriate hearing protectors. The OPERATIONS TECHNICIAN SUPERVISOR shall ensure proper use, storage, and maintenance of this equipment.

#### **D.2.5 Decontamination**

The Operations Technician Supervisor shall establish at least one personnel decontamination line in the Contamination Reduction Zone. Figure 2 above presents the proposed Decontamination Zone configuration. If non-disposable protective clothing or equipment is used, (for example a face shield or an air monitoring pump), it will be decontaminated (using trisodium phosphate detergent, or any ES&H Team-approved cleaning agent) and all rinse waters (if any) shall be contained, sampled, analyzed, and sent to HWM for treatment or disposal. If disposable protective clothing is used, disposal shall be properly handled by use of the Environmental Analyst-designated containers for all hazardous, radioactive, or mixed waste (e.g., used PPE generated by closure activities).

The release of equipment for its originally intended use shall follow the requirements of the *Health & Safety Manual*, Supplement 8.07. The Environmental Analyst shall provide guidance for the proper segregation, packaging, and disposal or recycling of scrap metal or other possible by-products of this closure activity.

Personnel involved in hands-on work shall remove PPE whenever leaving the Contamination Zone. This practice helps to reduce the potential for transfer of contaminants from the work site to other areas. Showers, if required, shall be provided by bringing portable showers to the immediate area of the work site. If showers are required, they shall meet the requirements of 29 CFR 1910.141. All rinse water shall be contained and disposed of as described in the above paragraph.

### **D.3 Radiological Controls**

The primary health physics objective of all engineering, PPE, and administrative controls for this project is to maintain radiation doses to workers as low as reasonably achievable and, in any case, well below applicable DOE limits. The DOE limit for total effective dose equivalent is 5,000 mrem/yr. The LLNL Administrative Control Level for total effective dose equivalent is 2,000 mrem/yr. By utilizing appropriate controls discussed in Attachment 2, workers involved in this project should not receive any measurable radiation doses.

Personnel involved in this work shall be monitored for internal contamination using bioassay and whole body/lung counting. They shall be monitored for external radiation exposure using personnel dosimeters. The workplace shall be monitored using air monitors and conventional swiping techniques.

A secondary health physics objective is to keep inadvertent releases of radioactivity to the environment as low as reasonably achievable. This objective shall be accomplished by the use of HEPA-filtered ventilation and by carefully surveying any items or personnel prior to their leaving potentially contaminated areas. Refer to Section D.1.1.1 above and Figure 2.

### **D.4 Industrial Safety Controls**

#### **D.4.1 General**

All personnel working on the project shall wear appropriate PPE, including eye protection, a hard hat whenever overhead hazards are present, and steel-toed shoes as may be required by the Operations Technician Supervisor in accordance with the Hazard Assessment form.

All forklift and crane equipment operators shall meet current qualifications as required in the LLNL *Health & Safety Manual*, Supplements 29.04A and 29.04B, and shall receive job-specific training conducted by a qualified individual at Building 419. This training shall be documented by the Support Services Supervisor and a copy of this training record shall remain at Building 419 and in the Documents and Assessment Group files.

All cranes shall be in full compliance with LLNL's *Health & Safety Manual*, Supplement 29.04B, and all other applicable DOE rules, regulations, or standards.

All forklifts shall comply with LLNL's *Health & Safety Manual*, Supplement 29.04 A, all current *Safety Wise* bulletins (especially #689), and the 1993 ANSI Standard B56.1, section 4.2, page 4.

Personnel shall not ignite an open flame, unless a fire permit is obtained through the Fire Department.

Clothing shall fit properly and not present loose or ragged elements that could present a hazard when working around moving parts, equipment, or tools. Hair shall be worn or restrained such that it can not get caught in moving parts. Dangling jewelry shall be removed to prevent any entanglement hazard. These items can become snagged in machinery and cause serious injury.

Personnel shall minimize climbing over or under obstacles or equipment. This practice shall reduce falling, falling objects, and being struck by hazards and associated injuries.

#### **D.4.2 Overexertion**

Work that entails reaching at levels above the shoulder or below the knees will be minimized. Provisions will be made to maintain work motions, such as bending, reaching, wiping, and cleaning, at ergonomically correct levels: below the shoulders and above the knees. Pallets for staging parts will be positioned at waist height whenever possible to reduce back strains that may result from lifting or placing items on the floor. Work performed near the floor (below knee level) will be accomplished by workers seated on a creeper or short stool. Work will be designed to minimize twisting motions. Heavy items will be moved with mechanical assistance. Implementation of these simple workplace controls can greatly reduce strains and repetitive motion and back injuries.

#### **D.4.3 Falls**

Scaffolding and portable platforms shall be provided in the place of ladders to reduce the possibilities of falls or overexertions. Work from the side of the ladder shall not be conducted. All spills shall be cleaned up immediately to prevent slips and possible falls. Approved ladders will be inspected daily and used in accordance with the LLNL *Health & Safety Manual*, Section 26.06.

### **E. Medical Surveillance**

Baseline and periodic health assessments for project personnel shall be conducted in accordance with LLNL requirements and 29 CFR 1910.120 (f), with specific criteria established by LLNL Health Services. If an individual has not completed an occupational medical examination within the past 12 months, Health Services may determine that another examination is unnecessary for this specific activity. The Project Leader with the assistance of the ES&H Team, will identify all personnel that are potentially exposed during this project and forward documentation to that individual's supervisor and the Health Services Department. Should any contractor personnel become involved in this project, their employer is responsible for medical surveillance, as will be specified in their contract with LLNL.

## **F. Monitoring Requirements**

Monitoring must be sufficient to determine the concentrations of hazardous or radioactive substances associated with decontamination and size reduction activities. Personal (breathing zone) air monitoring will be performed during this work to ensure that prescribed engineering or PPE controls are adequate. Wet bulb globe temperature monitoring shall be conducted to ensure appropriate work-rest cycles for protection from heat stress during use of impermeable coveralls and hoods. Hand-pump calorimetric detector tubes or similar devices for specific compounds will be used as determined by the Task-Specific Hazard Assessment. Similarly, a continuous air monitoring system with alarm capabilities and direct-reading alpha and beta/gamma contamination survey meters shall be used. Swipes shall be analyzed for gross alpha, gross beta, and tritium. Oberhoff survey meters will be available for the detection of tritium. All calibration and maintenance of monitoring equipment shall be performed in accordance with the manufacturer's recommendations or the LLNL Radcon Manual. Calibration and maintenance work shall be performed by the Hazards Control Instrument Lab or other competent individuals.

Since no work in confined spaces is anticipated, use of oxygen meters is not required at this time.

The Operations Technician Supervisor will be familiar with DOE Orders, California Occupational Safety and Health Act (OSHA), and Federal OSHA regulations governing exposure limits and appropriate Material Safety Data Sheet guidance for products. This information along with guidance from the Industrial Hygienist and the Health Physicist will ensure that a monitoring plan is properly directed to detect changes in concentrations of contaminants in or near closure activities.

## **G. Training Assignments**

All personnel working on this project shall have received the required level of health and safety training as specified in 29 CFR 1910.120 (p). All LLNL employees and contractor employees shall provide evidence of successful completion of the required training to the Operations Technician Supervisor prior to beginning work on this project. If 12 or more months have elapsed since receiving this training, personnel must provide evidence of having successfully completed 8 hours of refresher training. The Support Services Supervisor, Operations Technician Supervisor and worker supervisors are required to complete an additional 8 hours of supervisor training as specified in 29 CFR 1910.120 (p). Additional required training based on job junction is identified in Table 5.

**Table 5. Matrix of Required Training by Job Function**

<b>Job Function</b>	<b>First Aid CPR HS-1620 and HS-1640*</b>	<b>SARA OSHA EP0039 &amp; EP0039R  RCRA EP5003- 001</b>	<b>HHC HS-4050 Beryllium  HS-4255 Asbestos Safety HS-4420  (or Equivalent)</b>	<b>Radiation Protection  HS-6003 HS-6010 HS-6300 HS-6340 HS-6600 DOE Radio- logical Worker II</b>	<b>Daily Safety Review</b>	<b>Crane Safety  HS-5690 HS-5700**</b>	<b>Fork- Truck Safety  HS-5620**</b>	<b>HWM EP0006</b>
Support Services Supervisor	√	√	√		√	√	√	
Hazards Control Representatives			√		√			
Operations Technical Supervisor	√	√	√	√	√	√	√	√
Sampling Technicians		√	√	√	√			√
Operations Technicians	√	√	√	√	√	√	√	√
Plant Engineering Contract Support			√		√	√	√	
Occasional Site Workers/Visitors			√					

\* Two people minimum

\*\* Required training only for personnel who will operate crane and fork-trucks

**G.1 Work site-Specific Training**

Employees shall not engage in field activities until they have been trained to a level commensurate with their job function and the hazards and procedures addressed in this SSH&SP. Specific training shall address the following topics:

- Site Health and Safety Plan Discussion and Regulatory Overview
- Employee Rights and Responsibilities
- Site Control (authorized entry only, buddy system)
- Site Characterization, Operations and Site Activities
- Environmental, Health and Safety Planning

- Hazards Analysis
- Work Plan
- Safe Work Practices
- Hazard Communication Program
- Chemical and Physical Hazards
- Hazardous Substance Identification.
- Toxicology (per Health Hazard Communication)
- Decontamination, Entry, and Exit Controls
- Heat Stress
- Personal Protective Equipment
  - Clothing – Use, Care, and Limitations
  - Respirators and Fit Testing
- Monitoring and Sampling Techniques
- Medical Surveillance
- Emergencies.

All personnel shall attend a training session that addresses prohibited practices, emergency procedures and services, and general safety requirements. Visitors to the work site shall receive a briefing on safety procedures during closure operations prior to entering the area.

## **G.2 Field Briefings**

The Operations Technician Supervisor, or his/her designee, shall conduct and document daily health and safety field briefings at the beginning of each work day. Signatures of all closure personnel shall be required on this documentation. The workers shall be requested to identify the following in a group discussion format to reinforce team work and hazards control:

- Work activities for that day
- Hazard identification
- Health and safety requirements for that day
- Hazards control methods
- Monitoring requirements for that day
- Work zones
- Emergency signals
- Evacuation routes

- Upwind assembly point for evacuations
- Location of first aid, spill kits and emergency safety equipment.

### **G.3 First Aid**

The Operations Technician Supervisor shall identify all persons on the project who are trained and certified in first aid, including cardiopulmonary resuscitation (CPR). These individuals may be appointed as alternates to the Operations Technician Supervisor, if assistance is needed. At least one team member other than the Operations Technician Supervisor shall have current first aid and CPR certifications.

## **H. Maintenance, Inspection, and Quality Assurance of Facility Controls and Equipment**

Table 6 summarizes the controls or equipment in Building 419, the individual responsible for making sure the maintenance is performed, quality assurance requirements of the safety system, and the reference documenting maintenance requirements.

## **I. Emergency Procedures**

The procedures to be followed during any emergency involving a fire, spill, or injury are those contained within the Building 419 Emergency Response Plan (see Attachment 3). Help in emergency situations can be obtained by dialing 911, stating the problem, the location, and your name. Provide first aid to the injured if it is safe to do so. Employees trained to do so may 1) use a fire extinguisher to control any fire or 2) stop the spill or leak and clean up the spill if it is safe to do so. The Operations Technician Supervisor is responsible for isolating the area and coordinating emergency response during closure activities. If evacuation is necessary, all personnel shall proceed to an upwind checkpoint established by the Emergency Response Plan.

As soon as it is safe to do so, the Support Services Supervisor, the Operations Technician Supervisor, and the ES&H Team Leader shall be notified of all emergencies.

The LLNL *Health & Safety Manual*, Chapter 4, "Incidents — Notification, Analysis and Reporting," and the Building 419 Emergency Response Plan shall be consulted for information regarding documenting any emergency that occurs during closure activities.

### **I.1. Spill Containment Program**

The LLNL Fire Department shall be contacted by dialing 911 for any spills that cannot be contained and cleaned up safely by two individuals, in accordance with the guidelines established in the Building 419 Emergency Response Plan.

**Table 6. Facility Control Systems and Equipment Summary**

Safety System or Equipment	Responsible Individual	Reference
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Effluent Control System		
HEPA Filters on Hoods	HWM Support Services Supervisor / LLNL Plant Engineering/Hazards Control	<i>Health &amp; Safety Manual</i> , Chapter 12 and Appendices 12.01 and 12.05
Warning and Alarm System		
Audible evacuation information alarm system	LLNL Plant Engineering	<i>Health &amp; Safety Manual</i> , Chapter 11
Fire Alarm	LLNL Plant Engineering/Hazards Control	<i>Health &amp; Safety Manual</i> , Chapter 11
Evacuation Paging System	HWM Support Services Supervisor	<i>Health &amp; Safety Manual</i> , Chapter 11
Telephone System	HWM Support Services Supervisor	<i>Health &amp; Safety Manual</i> , Chapter 11
Fire Suppression Systems		
Fire Hydrants	Hazards Control	Health & Safety Manual, Chapter 25
Fire Extinguishers	Hazards Control	Health & Safety Manual, Chapter 25
Fire Sprinkler System	Hazards Control	Health & Safety Manual, Chapter 25
Radiation Monitoring Systems		
Continuous Air Monitor	Hazards Control	<i>Health &amp; Safety Manual</i> , Chapter 11
Exposure Monitor Stations	Hazards Control	<i>Health &amp; Safety Manual</i> , Chapter 11

*Continued*

**Table 6. Facility Control Systems and Equipment Summary (continued)**

Safety System or Equipment	Responsible Individual	Reference
Forklifts, Hoists and Walkabouts		
Fork trucks	HWM Support Services Supervisor	<i>Health &amp; Safety Manual</i> , Supplement 29.04A
Hoist	HWM Support Services Supervisor	<i>Health &amp; Safety Manual</i> , Supplement 29.04A
Walkabouts	HWM Support Services Supervisor	<i>Health &amp; Safety Manual</i> , Supplement 29.04A
ES&H Safety Equipment		
Eyewash Fountains	HWM Area 514 Supervisor	<i>Health &amp; Safety Manual</i> , Chapter 6
Emergency Showers	HWM Area 514 Supervisor	<i>Health &amp; Safety Manual</i> , Chapter 6
Emergency Spill Kits	HWM Area 514 Supervisor	<i>Health &amp; Safety Manual</i> , Chapter 21
Personal Protective Equipment	HWM Area 514 Supervisor	<i>Health &amp; Safety Manual</i> , Chapter 10

## **Attachment 1: SSH&SP Sign-off Sheet**

## Site-Specific Health and Safety Plan Review

This Site-Specific Health and Safety Plan was reviewed by the Responsible Individual, \_\_\_\_\_, and the operating personnel assigned to work under the auspices of this document. The listed hazards and their controls are clearly understood.

### Initial Review

Name	Signature	Date

## **Attachment 2: Hazard Assessment and Controls**

# Hazard Assessment and Control No.      HA#1

## Operation Description

Building <b>419</b>	Room/Area   124, 155	OSP/FSP/RWP No. or Con Space Permit   NA	Is One Required? <b>No</b>
ES&H Team No.	Preparation Date <b>9-18-94</b>	Operation Start Date <b>9-25-94</b>	
Supervisor or Responsible Person <b>Operations Tech Supervisor; EAS Supervisor</b>		Badge No. <b>TBD</b>	Phone/Pager No. <b>2-1807</b>
Operation Code (s)* <b>Cleaning</b>	Hours/Day <b>1-8 varies</b>	Days/Year <b>30-45</b>	

Operation Description:

**Wet wipe surfaces with water or water and trisodium phosphate, and collect swipe samples. Units to be wet wiped and sampled: 1) in Room 124-2 ultrasonic cleaners; 1 parts washer; 1 mercury bake out oven. 2) In Room 155, wet wipe safe, sink and the exterior only of the 8' hood. Check interior of safe for asbestos lining, the Asbestos Sampling Technologist will sample any suspect asbestos containing material using wet sampling methods per HA#5.**

Personnel Involved Name(s)	LLNL Employee No.	Job Category Code*	Probability of Exposure (1-10;10 maximum)
<b>TBD</b>	<b>TBD</b>	<b>Hazardous Waste Tech (2)</b>	<b>2</b>
<b>TBD</b>	<b>TBD</b>	<b>EAS Techs (2)</b>	<b>2</b>
<b>TBD</b>	<b>TBD</b>	<b>Health &amp; Safety Technologist</b>	<b>0.1</b>
<b>TBD</b>	<b>TBD</b>	<b>Asbestos sampling Tech</b>	<b>2</b>
<b>TBD</b>	<b>TBD</b>	<b>Operations Tech Supervisor</b>	<b>2</b>

## Hazard Evaluation

Hazard\*: Inhalation, ingestion, injection or skin absorption (iiisa) of toxic or radioactive materials (alpha, beta and gamma:  $\alpha$ ,  $\beta$ ,  $\gamma$ ) during wet wiping. Over exertion, cuts, spills, trips and fall hazards see section C-3 and D-4 of the SSH&SP. See MSDS file in B-419.

Potential for:		IDLH <b>No</b>	Oxygen Deficiency <b>No</b>		Peroxide Formation <b>No</b>		
No.	Agent	Exposure: Fraction of Standard*	Exposure Type*	Exposure Pathway(s)*	Evaluation Type*	Current Standard	Reference Source*
1	<b>arsenic</b>	<b>&lt;0.01 x</b>	<b>8-hr PEL</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>10 ug/m3</b>	<b>Fed OSHA</b>
2	<b><math>\alpha</math>, <math>\beta</math>, <math>\gamma</math></b>	<b>back- ground</b>	<b>annual</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>2 mrem/yr</b>	<b>Rad Con Manual</b>
3	<b>beryllium</b>	<b>&lt;0.01 x &lt;0.01 x &lt;0.01 x</b>	<b>8-hr TWA 30"STEL Ceiling</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>1 ug/m3 5 ug/m3 25 ug/m3</b>	<b>DOE Draft OSHA OSHA</b>

*Continued*

\* Refers to Items with Lookup Tables

## Hazard Assessment and Control No. HA#1 (continued)

### Hazard Evaluation (continued)

No.	Agent	Exposure: Fraction of Standard*	Exposure Type*	Exposure Pathway(s)*	Evaluation Type*	Current Standard	Reference Source*
4	cadmium	<0.01 x	8-hr TWA	iiisa	Qualitative	5 ug/m3	OSHA
5	chromium	<0.01 x	8-hr TWA	iiisa	Qualitative	50 ug/m3	DOE/ACGIH
6	cobalt	<0.01 x	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA
7	asbestos	<0.01 x	8-hr TWA 30" STEL	iiisa	Qualitative	0.2 f/cc 2.0 f/cc	OSHA OSHA
8	mercury	<0.1 x	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA
9	nickel	<0.01 x	8-hr TWA	iiisa	Qualitative	100 ug/m3	OSHA
10	lead	<0.01 x	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA

Is Additional Monitoring Necessary?    Yes **X**    No    Under Review

Rationale: Wet methods will mitigate potential for most particulate airborne exposures. Radionuclides will be monitored real time per standard operating procedures.

If the Answer is Yes, Also Complete the Following:

Monitoring Types(s):	Breathing Zone	Area Sample	Ceiling	TWA
	STEL	Swipe	Bioassay	Other (specify)
Agent No.	Method*	Medical Surveillance	Date(s) for Initial Monitoring	Air Monitoring Frequency* *
<b>Mercury</b>	<b>Direct reading Hg meter</b>	<b>no</b>	<b>All tasks in Hg ovens</b>	<b>Continuously if &gt;25 ug/m3; each hour if &lt;5 ug/m3.</b>
<b>Alpha, tritium</b>				
<b>beta, gamma</b>				

Prepared By: Sarah G. Lane, Chris Miles

Approved By:

Industrial Hygienist

Approved By:

Health Physicist

**Continued**

\* Refers to Items with Lookup Tables

## Hazard Assessment and Control No. HA#1 (continued)

### General Comments HA#1

The Operations Technician Supervisor or the Lead Tech assigned to this job shall provide a written description in chronological order of 1) the steps to be taken, 2) the chemicals (with the MSDSs) and exact tools to be used, 3) the name and employee numbers of the individuals assigned, 4) the recognized hazards of each step, and 5) the PPE, engineering and administrative controls to be used to ensure the safety of this operation. Between 1 and 7 days before this task the Operations Technician Supervisor or the Lead Tech shall review the proposed steps with the ES&H Team (including a minimum of the H&S Technologist and disciplines from HP, IH, IS and EA) and obtain signatures indicating approval to proceed.

### Control Methods

Engineering Controls: .

Glovebox No.		Hood/Fan No.		Portable Ventilation	
Eyewash/Shower		Interlocks		Other	
Carcinogen Control Level:	Low	X	Medium	High	

Administrative Controls: Buddy system, see C-3 and C-4; D-2, D-3 and D-4.

### Control Methods (continued)

Training Requirements: **See Section G of this SSH&SP**

Posting/Labeling:	HHC Poster	<b>At entrance</b>	Other
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Others(s):

Personal Protective Equipment:

Gloves* Select from: <b>Pylox, 4-H, butyl, inner gloves must be water impermeable. Use leather for sharp edges if any.</b>	Garments* <b>LLNL issued Lab coat or overalls</b>
Safety Shoe <b>yes</b>	Head Protection <b>none</b>
Shoe Covers <b>yes, disposable</b>	Hearing Protection <b>none</b>
Eye Protection* <b>yes, safety glasses or face shield</b>	
Other <b>none</b>	

Respiratory Protection Requirements:\* **None for this task (for asbestos sampling see HA#5)**

Air Purifying:

Disposable:	Dust/Mist	Paint/Pest.	Cartridge	Cannister
Half Mask			HEPA	Acid Gas
Full Face			Org. Vapor	
PAPR	Mask/Hood/Helmet		Combination (specify)	

Air Supplied:

SCBA	
Airline-Resp./Facepiece Type*	Air Source & Location
Egress Requirement?	

*Continued*

## Hazard Assessment and Control No. HA#1 (continued)

### Additional Control Requirements/Procedures

Frequency of Respirator Exchange (if not daily)

Issue Point Administrator

Badge No.

Issue Point Location **Building 419 or Respiratory Shop**

Expiration/Update Date **9-26-95**

**All respirator wears must be 1) medically approved for respirator wear, 2) quantitatively fit-tested by Respirator Shop onsite, and 3) trained per ANSI Standard Z88.2 (latest edition) and have no facial hair or clothing between the skin and the respirator seal.**

**Decontamination:**

**Whole body frisking with a LLNL "Blue Alpha" meter and a GM meter with a "pancake" probe is required for all workers before exiting established Exclusion Zones.**

**Wash reusable PPE, reusable equipment and exposed body parts with damp towels. Wash hands and face with soap and water (available in the support zone) before leaving building.**

# Hazard Assessment and Control No.      HA#2

## Operation Description

Building <b>419</b>	Room/Area <b>124, 155, 167</b>	OSP/FSP/RWP No. or Con Space Permit <b>NA</b>	Is One Required? <b>No</b>
ES&H Team No.	Preparation Date <b>9-18-94</b>	Operation Start Date <b>9-25-94</b>	
Supervisor or Responsible Person <b>Supervisor; EAS Supervisor</b>	<b>Operations Tech</b>	Badge No. <b>TBD</b>	Phone/Pager No. <b>2-1807</b>
Operation Code (s)* <b>Cleaning</b>	Hours/Day <b>1-8 varies</b>	Days/Year <b>30-45</b>	

Operation Description: **Wet wipe surfaces with water or water and trisodium phosphate. Units to be wet wiped and sampled: 1) in Room 124-2 ultrasonic cleaners; 1 parts washer; 1 mercury bake out oven. 2) In Room 155, wet wipe safe, sink and the exterior only of the 8' hood. Check interior of safe for asbestos lining, sample any suspect asbestos containing material using wet sampling methods.**

Personnel Involved Name(s)	LLNL Employee No.	Job Category Code*	Probability of Exposure (1-10;10 maximum)
<b>TBD</b>	<b>TBD</b>	<b>Hazardous Waste Tech (2)</b>	<b>2</b>
<b>TBD</b>	<b>TBD</b>	<b>EAS Techs (2)</b>	<b>2</b>
<b>TBD</b>	<b>TBD</b>	<b>Health &amp; Safety Technologist</b>	<b>0.1</b>
<b>TBD</b>	<b>TBD</b>	<b>Operations Tech Supervisor</b>	<b>2</b>

## Hazard Evaluation

Hazard\*: Inhalation, ingestion, injection or skin absorption (iiisa) of toxic or radioactive materials (alpha, beta and gamma:  $\alpha$ ,  $\beta$ ,  $\gamma$ ) during wet wiping. Over exertion, cuts, spills, trips and fall hazards see section C-3 and D-4 of the SSH&SP. See MSDSs attached.

Potential for:		IDLH	No	Oxygen Deficiency	No	Peroxide Formation	No
No.	Agent	Exposure: Fraction of Standard*	Exposure Type*	Exposure Pathway(s)*	Evaluation Type*	Current Standard	Reference Source*
1	<b>arsenic</b>	<b>&lt;0.01</b>	<b>8-hr PEL</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>10 ug/m3</b>	<b>Fed OSHA</b>
2	<b><math>\alpha</math>, <math>\beta</math>, <math>\gamma</math></b>	<b>back-ground</b>	<b>annual</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>2 mrem/yr</b>	<b>Rad Con Manual</b>
3	<b>beryllium</b>	<b>&lt;0.01 X &lt;0.1 X</b>	<b>8-hr TWA 30"STEL Ceiling</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>1 ug/m3 5 ug/m3 25 ug/m3</b>	<b>Draft DOE OSHA OSHA</b>
4	<b>cadmium</b>	<b>&lt;0.01 X</b>	<b>8-hr TWA</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>5 ug/m3</b>	<b>OSHA</b>
5	<b>chromium</b>	<b>&lt;0.01 X</b>	<b>8-hr TWA</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>50 ug/m3</b>	<b>DOE/ACGIH</b>
6	<b>cobalt</b>	<b>&lt;0.01 X</b>	<b>8-hr TWA</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>50 ug/m3</b>	<b>OSHA</b>

*Continued*

\* Refers to Items with Lookup Tables

## Hazard Assessment and Control No.      HA#2 (continued)

### Hazard Evaluation (continued)

No.	Agent	Exposure: Fraction of Standard*	Exposure Type*	Exposure Pathway(s)*	Evaluation Type*	Current Standard	Reference Source*
7	asbestos	<0.01 X	30" STEL	iiisa	Qualitative	2 f/cc	OSHA
8	mercury	<0.1 X	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA
9	nickel	<0.01 X	8-hr TWA	iiisa	Qualitative	100 ug/m3	OSHA
10	lead	<0.01 X	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA

Is Additional Monitoring Necessary?    Yes   **X**    No    Under Review

Rationale: Wet methods will mitigate potential for most particulate airborne exposures. Radionuclides will be monitored real time per standard operating procedures.

If the Answer is Yes, Also Complete the Following:

Monitoring Types(s):	Breathing Zone	Area Sample	Ceiling	TWA
	STEL	Swipe	Bioassay	Other (specify)
Agent No.	Method*	Medical Surveillance	Date(s) for Initial Monitoring	Periodic Monitoring Frequency* *
<b>Mercury</b>	<b>Direct reading Hg meter</b>	<b>no</b>	<b>All tasks in Hg ovens</b>	<b>Continuously if &gt;0.5 TWA; each hour if &lt;0.1 TWA.</b>
<b>Alpha, tritium</b>				
<b>beta, gamma</b>				

Prepared By: Sarah G. Lane, Chris Miles

Approved By:

Industrial Hygienist

Approved By:

Health Physicist

### General Comments

The Operations Technician Supervisor or the Lead Tech assigned to this job shall provide a written description in chronological order of 1) the steps to be taken, 2) the chemicals (with the MSDSs) and exact tools to be used, 3) the name and employee numbers of the individuals assigned, 4) the recognized hazards of each step, and 5) the PPE, engineering and administrative controls to be used to ensure the safety of this operation. Between 1 and 7 days before this task the Operations Technician Supervisor or the Lead Tech shall review the proposed steps with the ES&H Team (including a minimum of the H&S Technologist and disciplines from HP, IH, IS and EA) and obtain signatures indicating approval to proceed.

*Continued*

\* Refers to Items with Lookup Tables

# Hazard Assessment and Control No. HA#2 (continued)

## Control Methods

Engineering Controls: Use hoods where possible.

Glovebox No.	Hood/Fan No.	Portable Ventilation
Eyewash/Shower	Interlocks	Other

## Control Methods (continued)

Carcinogen Control Level:	Low <b>X</b>	Medium	High
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Administrative Controls: Buddy system, see C-3 and D-3; C-4 and D-4.

Training Requirements: **See Section G of this SSH&SP**

Posting/Labelling:	HHC Poster <b>At entrance</b>	Other
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Others(s):

Personal Protective Equipment:

Gloves* <b>Pylox, 4-H, butyl, inner gloves must be water impermeable. Use leather for sharp edges if any.</b>	Garments* <b>LLNL issued Lab coat or overalls</b>
Safety Shoe <b>yes</b>	Head Protection <b>none</b>
Shoe Covers <b>yes, disposable</b>	Hearing Protection <b>none</b>

Eye Protection\* **yes, safety glasses or face shield**

Other **none**

Respiratory Protection Requirements:\* **None for this task**

Air Purifying:

Disposable:	Dust/Mist	Paint/Pest.	Cartridge	Cannister
Half Mask			HEPA	Acid Gas
Full Face			Org. Vapor	
PAPR	Mask/Hood/Helmet		Combination (specify)	

Air Supplied:

SCBA

Airline-Resp./Facepiece Type*	Air Source & Location
Egress Requirement?	

Frequency of Respirator Exchange (if not daily)

Issue Point Administrator	Badge No.
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Issue Point Location **Building 419 or Respiratory Shop**

Expiration/Update Date **9-26-95**

*Continued*

## Hazard Assessment and Control No. HA#2 (continued)

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All respirator wears must be 1) medically approved for respirator wear, 2) quantitatively fit-tested by Respirator Shop onsite, and 3) trained per ANSI Standard Z88.2 (latest edition) and have no facial hair or clothing between the skin and the respirator seal.

Whole body frisking with a LLNL "Blue Alpha" meter and a GM meter with a "pancake" probe is required for all workers before exiting established Exclusion Zones.

Wash hands and face before leaving building.

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### Additional Control Requirements/Procedures

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# Hazard Assessment and Control No.      HA#2A

## Operation Description

Building <b>419</b>	Room/Area 124, 155, 167	OSP/FSP/RWP No. or Con Space Permit <b>NA</b>	Is One Required? <b>No</b>
ES&H Team No.	Preparation Date <b>9-18-94</b>	Operation Start Date <b>9-25-94</b>	
Supervisor or Responsible Person <b>Closure Project Leader; Operations Tech Supervisor; EAS Supervisor</b>		Badge No. <b>TBD</b>	Phone/Pager No. <b>2-1807</b>
Operation Code (s)* <b>Paint removal and disassembly</b>	Hours/Day <b>1-8 varies</b>	Days/Year <b>20</b>	

Operation Description:   **Wet wipe surfaces with water or water and trisodium phosphate first, then soak surfaces with water and Tri sodium phophate detergent, brush with soft bristle brush to clean surfaces, if necessary. Clean Room 124: Ultrasonic cleaners, part washer, bake out oven; Room 155: sink, walk in 8' hood, safe. Swipe sample surfaces per B-419 Sampling and Analysis Plan.**

Personnel Involved Name(s)	LLNL Employee No.	Job Category Code*	Probability of Exposure (1-10;10 maximum)
<b>TBD</b>	<b>TBD</b>	<b>Hazardous Waste Tech (2)</b>	<b>2</b>
<b>TBD</b>	<b>TBD</b>	<b>EAS Techs (2)</b>	<b>2</b>
<b>TBD</b>	<b>TBD</b>	<b>Health &amp; Safety Technologist</b>	<b>0.1</b>
<b>TBD</b>	<b>TBD</b>	<b>Operations Tech Supervisor</b>	<b>2</b>

## Hazard Evaluation

Hazard\*:   **Inhalation, ingestion, injection or skin absorption (iiisa) of toxic or radioactive materials (alpha, beta and gamma:  $\alpha$ ,  $\beta$ ,  $\gamma$ ) during wet wiping/brushing. Ultrasonic cleaners, parts washer and bake out oven are suspected to be clean for release to salvage. No mercury detected over background levels with direct reading Jerome instrument. Swipe to confirm. Over exertion, cuts, spills, trips and fall hazards see section C-3 and D-4 of the SSH&SP. See MSDSs available in B-419.**

Potential for:   IDLH <b>No</b>		Oxygen Deficiency <b>No</b>		Peroxide Formation <b>No</b>			
No.	Agent	Exposure: Fraction of Standard*	Exposure Type*	Exposure Pathway(s)*	Evaluation Type*	Current Standard	Reference Source*
1	<b>arsenic</b>	<b>&lt;0.001X</b>	<b>8-hr PEL</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>10 ug/m3</b>	<b>Fed OSHA</b>
2	<b>alpha, <math>\alpha</math> beta, <math>\beta</math> gamma, <math>\gamma</math></b>	<b>1-5 X Back-ground</b>	<b>annual</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>2 mrem/yr</b>	<b>Rad Con Manual</b>
3	<b>beryllium</b>	<b>&lt;0.01 X &lt;0.5 X</b>	<b>8-hr TWA 30"STEL Ceiling</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>1 ug/m3 5 ug/m3 25 ug/m3</b>	<b>Draft DOE OSHA OSHA</b>
4	<b>cadmium</b>	<b>&lt;0.01 X</b>	<b>8-hr TWA</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>5 ug/m3</b>	<b>OSHA</b>
5	<b>chromium</b>	<b>&lt;0.001X</b>	<b>8-hr TWA</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>50 ug/m3</b>	<b>DOE/ACGIH</b>

*Continued*

\* Refers to Items with Lookup Tables

## Hazard Assessment and Control No. HA#2A(continued)

### Hazard Evaluation (continued)

No.	Agent	Exposure: Fraction of Standard*	Exposure Type*	Exposure Pathway(s)*	Evaluation Type*	Current Standard	Reference Source*
6	cobalt	<0.001	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA
7	asbestos	<0.1	30" STEL	iiisa	Qualitative	2 f/cc	OSHA
8	mercury	<0.5 X	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA
9	nickel	<0.01 X	8-hr TWA	iiisa	Qualitative	100 ug/m3	OSHA
10	lead	<0.01 X	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA

Is Additional Monitoring Necessary?    Yes **X**    No    Under Review

**Rationale: Wet methods will mitigate potential for most particulate airborne exposures. Radionuclides will be monitored real time per standard operating procedures.**

If the Answer is Yes, Also Complete the Following:

Monitoring Types(s):	Breathing Zone	Area Sample	Ceiling	TWA
	STEL	Swipe	Bioassay	Other (specify)
Agent No.	Method*	Medical Surveillance	Date(s) for Initial Monitoring	Air Monitoring Frequency* *
<b>Mercury</b>	<b>Direct reading Hg meter</b>	<b>no</b>	<b>All tasks in Hg ovens</b>	<b>Continuously if &gt;0.5 TWA; each hour if &lt;0.1 TWA.</b>
<b>Alpha, tritium</b>				
<b>beta, gamma</b>				

Prepared By: Sarah G. Lane, Chris Miles

Approved By:

Industrial Hygienist

Approved By:

Health Physicist

### General Comments

The Operations Technician Supervisor or the Lead Tech assigned to this job shall provide a written description in chronological order of 1) the steps to be taken, 2) the chemicals (with the MSDSs) and exact tools to be used, 3) the name and employee numbers of the individuals assigned, 4) the recognized hazards of each step, and 5) the PPE, engineering and administrative controls to be used to ensure the safety of this operation. Between 1 and 7 days before this task the Operations Technician Supervisor or the Lead Tech shall review the proposed steps with the ES&H Team (including a minimum of the H&S Technologist and disciplines from HP, IH, IS and EA) and obtain signatures indicating approval to proceed.

*Continued*

\* Refers to Items with Lookup Tables

# Hazard Assessment and Control No. HA#2A(continued)

Control Methods				
Engineering Controls: Use hoods where possible.				
Glovebox No.		Hood/Fan No.		Portable Ventilation
Eyewash/Shower		Interlocks		Other
Carcinogen Control Level:	Low <b>X</b>	Medium	High	
Administrative Controls: Buddy system, see C-3 and D-3; C-4 and D-4.				
Training Requirements: <b>See Section G of this SSH&amp;SP</b>				
Posting/Labelling:	HHC Poster	<b>At entrance</b>	Other	
Others(s):				
Personal Protective Equipment:				
Gloves* <b>Pylox, latex, 4-H, Silvershield, nitrile, butyl, inner gloves must be water impermeable. Use leather for sharp edges if any.</b>			Garments* <b>LLNL issued Lab coat or overalls</b>	
Safety Shoe <b>yes</b>			Head Protection <b>none</b>	
Shoe Covers <b>yes, disposable</b>			Hearing Protection <b>none</b>	
Eye Protection* <b>yes, safety glasses or face shield</b>				
Other <b>none</b>				
Respiratory Protection Requirements:* <b>None for this task</b>				
Air Purifying:				
Disposable:	Dust/Mist	Paint/Pest.	Cartridge	Cannister
Half Mask			HEPA	Acid Gas
Full Face			Org. Vapor	
PAPR	Mask/Hood/Helmet		Combination (specify)	
Air Supplied:				
SCBA				
Airline-Resp./Facepiece Type*			Air Source & Location	
Egress Requirement?				
Frequency of Respirator Exchange (if not daily)				
Issue Point Administrator			Badge No.	
Issue Point Location <b>Building 419 or Respiratory Shop</b>				
Expiration/Update Date <b>9-26-95</b>				

*Continued*

## **Hazard Assessment and Control No.      HA#2A(continued)**

All respirator wears must be 1) medically approved for respirator wear, 2) quantitatively fit-tested by Respirator Shop onsite, and 3) trained per ANSI Standard Z88.2 (latest edition) and have no facial hair or clothing between the skin and the respirator seal.

### **Decontamination:**

Whole body frisking with a LLNL "Blue Alpha" meter and a GM meter with a "pancake" probe is required for all workers before exiting established Exclusion Zones.

Wash reusable PPE, reusable equipment and exposed body parts with damp towlettes. Wash hands and face with soap and water before leaving building.

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### **Additional Control Requirements/Procedures**

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# Hazard Assessment and Control No.      HA#2B

## Operation Description

Building <b>419</b>	Room/Area 124,	OSP/FSP/RWP No. or Con Space Permit <b>NA</b>	Is One Required? <b>No</b>
ES&H Team No.	Preparation Date <b>9-18-94</b>	Operation Start Date <b>9-25-94</b>	
Supervisor or Responsible Person <b>Operations Tech Supervisor; EAS Supervisor</b>		Badge No. <b>TBD</b>	Phone/Pager No. <b>2-1807</b>
Operation Code (s)* <b>Paint removal and disassembly</b>	Hours/Day <b>1-8 varies</b>	Days/Year <b>20</b>	

Operation Description:   **Wet wipe surfaces with water or water and trisodium phosphate first, then soak surfaces with water and Tri sodium phophate detergent, brush with soft bristle brush to clean surfaces, if necessary. Contact IH to discuss paint removal technology. Clean Room 155: 6' hood, safe and Room 167: vapor degreaser.**

Personnel Involved Name(s)	LLNL Employee No.	Job Category Code*	Probability of Exposure (1-10;10 maximum)
<b>TBD</b>	<b>TBD</b>	<b>Hazardous Waste Tech (2)</b>	<b>2</b>
<b>TBD</b>	<b>TBD</b>	<b>EAS Techs (2)</b>	<b>2</b>
<b>TBD</b>	<b>TBD</b>	<b>Health &amp; Safety Technolgist</b>	<b>0.1</b>
<b>TBD</b>	<b>TBD</b>	<b>Operations Tech Supervisor</b>	<b>2</b>

## Hazard Evaluation

Hazard\*:   **Inhalation, ingestion, injection or skin absorption (iiisa) of toxic or radioactive materials (alpha, beta and gamma:  $\alpha$ ,  $\beta$ ,  $\gamma$ ) during wet wiping. Over exertion, cuts, spills, trips and fall hazards see section C-3 and D-4 of the SSH&SP. See MSDSs attached.**

Potential for:		IDLH <b>No</b>	Oxygen Deficiency <b>No</b>		Peroxide Formation <b>No</b>		
No.	Agent	Exposure: (no PPE) Fraction of Standard*	Exposure Category*	Exposure Pathway(s)*	Evaluation Type*	Current Standard	Reference Source*
1	<b>arsenic</b>	<b>&lt;0.01 X</b>	<b>8-hr PEL</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>10 ug/m3</b>	<b>Fed OSHA</b>
2	<b>alpha, <math>\alpha</math> beta, <math>\beta</math> gamma, <math>\gamma</math></b>	<b>Back-ground</b>	<b>annual</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>2 mrem/yr</b>	<b>Rad Con Manual</b>
3	<b>beryllium</b>	<b>&lt;0.01 X &lt;0.1 X</b>	<b>8-hr TWA 30"STEL Ceiling</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>1 ug/m3 5 ug/m3 25 ug/m3</b>	<b>Draft DOE OSHA OSHA</b>
4	<b>cadmium</b>	<b>&lt;0.1 X</b>	<b>8-hr TWA</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>5 ug/m3</b>	<b>OSHA</b>

*Continued*

\* Refers to Items with Lookup Tables

# Hazard Assessment and Control No.      HA#2B(continued)

## Hazard Evaluation (continued)

No.	Agent	Exposure: (no PPE) Fraction of Standard*	Exposure Category*	Exposure Pathway(s)*	Evaluation Type*	Current Standard	Reference Source*
5	chromium	<0.1 X	8-hr TWA	iiisa	Qualitative	50 ug/m3	DOE/ACGIH
6	cobalt	<0.1 X	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA
7	asbestos	<0.01 X	30" STEL	iiisa	Qualitative	2 f/cc	OSHA
8	mercury	<0.5 X	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA
9	nickel	<0.01 X	8-hr TWA	iiisa	Qualitative	100 ug/m3	OSHA
10	lead	<0.01 X	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA

Is Additional Monitoring Necessary?    Yes   **X**    No    Under Review

Rationale: Wet methods will mitigate potential for most particulate airborne exposures. Radionuclides will be monitored real time per standard operating procedures.

If the Answer is Yes, Also Complete the Following:

Monitoring Types(s):	Breathing Zone	Area Sample	Ceiling	TWA
	STEL	Swipe	Bioassay	Other (specify)

Agent No.	Method*	Medical Surveillance	Date(s) for Initial Monitoring	Air Monitoring Frequency* *
<b>Mercury</b>	<b>Direct reading Hg meter</b>	<b>no</b>	<b>All tasks in Hg ovens</b>	<b>Continuously if &gt;0.5 TWA; each hour if &lt;0.1 TWA.</b>
<b>Alpha, tritium</b>				
<b>beta, gamma</b>				

Prepared By: Sarah G. Lane, Chris Miles

Approved By:

Industrial Hygienist

Approved By:

Health Physicist

*Continued*

\* Refers to Items with Lookup Tables

# Hazard Assessment and Control No. HA#2B(continued)

## General Comments

The Operations Technician Supervisor or the Lead Tech assigned to this job shall provide a written description in chronological order of 1) the steps to be taken, 2) the chemicals (with the MSDSs) and exact tools to be used, 3) the name and employee numbers of the individuals assigned, 4) the recognized hazards of each step, and 5) the PPE, engineering and administrative controls to be used to ensure the safety of this operation. Between 1 and 7 days before this task the Operations Technician Supervisor or the Lead Tech shall review the proposed steps with the ES&H Team (including a minimum of the H&S Technologist and disciplines from HP, IH, IS and EA) and obtain signatures indicating approval to proceed.

## Control Methods HA#2B

Engineering Controls: Use hoods where possible.

Glovebox No.	Hood/Fan No.	Portable Ventilation
Eyewash/Shower	Interlocks	Other
Carcinogen Control Level:	Low <b>X</b>	Medium
		High

Administrative Controls: Buddy system, see C-3 and D-3; C-4 and D-4.

Training Requirements: **See Section G of this SSH&SP**

Posting/Labelling:	HHC Poster <b>At entrance</b>	Other
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Others(s):

Personal Protective Equipment:

Gloves* <b>Pylox, 4-H, silvershield, nitrile, butyl, inner gloves must be water impermeable. Use leather for sharp edges if any.</b>	Garments* <b>LLNL issued Lab coat or overalls, apron or tyvex to keep clothing dry.</b>
Safety Shoe <b>yes</b>	Head Protection <b>none</b>
Shoe Covers <b>yes, disposable</b>	Hearing Protection <b>none</b>
Eye Protection* <b>yes, safety glasses or face shield</b>	
Other <b>none</b>	

Respiratory Protection Requirements:\* **Protection factor of 10 or better.**

Air Purifying:

Disposable:	Dust/Mist	Paint/Pest.	Cartridge	Cannister
Half Mask	<b>X</b>	HEPA <b>X</b>	Acid Gas	
Full Face		Org. Vapor		
PAPR	Mask/Hood/Helmet	Combination (specify)		

**Continued**

## Hazard Assessment and Control No. HA#2B(continued)

### Control Methods (continued)

Air Supplied:

SCBA

Airline-Resp./Facepiece Type\*

Air Source & Location

Egress Requirement?

Frequency of Respirator Exchange (if not daily)

Issue Point Administrator **Operations Tech Supervisor**

Badge No. **TBD**

Issue Point Location **Building 419 or Respiratory Shop**

Expiration/Update Date **9-26-95**

**All respirator wears must be 1) medically approved for respirator wear, 2) quantitatively fit-tested by Respirator Shop onsite, and 3) trained per ANSI Standard Z88.2 (latest edition) and have no facial hair or clothing between the skin and the respirator seal.**

**Whole body frisking with a LLNL "Blue Alpha" meter and a GM meter with a "pancake" probe is required for all workers before exiting established Exclusion Zones.**

Wash face and hands before eating, drinking, smoking, or exiting building.

### Additional Control Requirements/Procedures

# Hazard Assessment and Control No.      HA#3

## Operation Description

Building <b>419</b>	Room/Area <b>124, 155, 167</b>	OSP/FSP/RWP No. or Con Space Permit <b>NA</b>	Is One Required? <b>No</b>
ES&H Team No.	Preparation Date <b>9-18-94</b>	Operation Start Date <b>9-25-94</b>	
Supervisor or Responsible Person <b>Supervisor; EAS Supervisor</b>	<b>Operations Tech</b>	Badge No. <b>TBD</b>	Phone/Pager No. <b>2-1807</b>
Operation Code (s)* <b>Paint removal and cutting with torch</b>	Hours/Day <b>1-8 varies</b>	Days/Year <b>20</b>	

Operation Description:    **Paint removal and torch cutting**

Personnel Involved Name(s)	LLNL Employee No.	Job Category Code*	Probability of Exposure (1-10;10 maximum)
<b>TBD</b>	<b>TBD</b>	<b>Hazardous Waste Tech (2)</b>	<b>2</b>
<b>TBD</b>	<b>TBD</b>	<b>Plant welders (2)</b>	<b>5</b>
<b>TBD</b>	<b>TBD</b>	<b>Health &amp; Safety Technologist</b>	<b>0.1</b>
<b>TBD</b>	<b>TBD</b>	<b>Operations Tech Supervisor</b>	<b>1</b>

## Hazard Evaluation

Hazard\*: **Inhalation, ingestion, injection or skin absorption (iiisa) of toxic or radioactive materials (alpha, beta and gamma:  $\alpha$ ,  $\beta$ ,  $\gamma$ ) during paint and surface coating removal operations and welding. Thermal and ultraviolet light burns possible. Over exertion, cuts, spills, trips and fall hazards see section C-3,4 and D-3,4 of the SSH&SP. See MSDSs at B-419.**

Potential for:		IDLH <b>No</b>	Oxygen Deficiency <b>No</b>		Peroxide Formation <b>No</b>		
No.	Agent	Exposure (no PPE): Fraction of Standard*	Exposure Category*	Exposure Pathway(s)*	Evaluation Type*	Current Standard	Reference Source*
1	<b>Fe<sub>2</sub>O<sub>3</sub>- iron oxide</b>	<b>0.75 X</b>	<b>8-hr PEL</b>	<b>inhalation</b>	<b>Qualitative</b>	<b>5000 ug/m3</b>	<b>ACGIH</b>
2	<b>alpha, <math>\alpha</math> beta, <math>\beta</math> gamma, <math>\gamma</math></b>	<b>back- ground</b>	<b>annual</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>2 mrem/yr</b>	<b>Rad Con Manual</b>
3	<b>beryllium</b>	<b>&lt;0.5 X &lt;0.5 X</b>	<b>8-hr TWA 15"STEL Ceiling</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>1 ug/m3 5 ug.m3 25 ug/m3</b>	<b>Draft DOE OSHA OSHA</b>

*Continued*

\* Refers to Items with Lookup Tables

## Hazard Assessment and Control No.      HA#3 (continued)

### Hazard Evaluation (continued)

No.	Agent	Exposure (no PPE): Fraction of Standard*	Exposure Category*	Exposure Pathway(s)*	Evaluation Type*	Current Standard	Reference Source*
4	cadmium	<0.2 X	8-hr TWA	iiisa	Qualitative	5 ug/m3	OSHA
5	chromium	<0.1 X	8-hr TWA	iiisa	Qualitative	50 ug/m3	DOE/ACGIH
6	cobalt	<0.1 X	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA
7	asbestos	<0.1	8-hr TWA 30" STEL	iiisa	Qualitative	2 f/cc	OSHA
8	ozone	<1 X	Ceiling	iiisa	Qualitative	0.1 ppm	ACGIH
9	nickel	<0.1 X	8-hr TWA	iiisa	Qualitative	100 ug/m3	OSHA
10	lead	<0.5 X	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA

Is Additional Monitoring Necessary?    Yes    **X**    No    Under Review

Rationale: Wet methods will mitigate potential for most particulate airborne exposures. Radionuclides will be monitored real time per standard operating procedures.

If the Answer is Yes, Also Complete the Following:

Monitoring Types(s):	Breathing Zone	Area Sample	Ceiling	TWA
	STEL	Swipe	Bioassay	Other (specify)
Agent No.	Method*	Medical Surveillance	Date(s) for Initial Monitoring	Air Monitoring Frequency* *
<b>Mercury</b>	<b>Direct reading Hg meter</b>	<b>no</b>	<b>first day of task</b>	<b>Continuously if &gt;0.5 TWA; each hour if &lt;0.1 TWA.</b>
<b>Metals (pump)</b>	<b>ICP or AA, NIOSH</b>	<b>no</b>	<b>first day</b>	<b>see IH</b>
<b>Ozone</b>	<b>Draeger tubes</b>	<b>no</b>	<b>first day</b>	<b>see IH</b>
<b>Alpha, tritium</b>				
<b>beta, gamma</b>				

Prepared By: Sarah G. Lane, Chris Miles

Approved By:

Industrial Hygienist

Approved By:

Health Physicist

\* Refers to Items with Lookup Tables

# Hazard Assessment and Control No. HA#3 (continued)

## General Comments

The Operations Technician Supervisor or the Lead Tech assigned to this job shall provide a written description in chronological order of 1) the steps to be taken, 2) the chemicals (with the MSDSs) and exact tools to be used, 3) the name and employee numbers of the individuals assigned, 4) the recognized hazards of each step, and 5) the PPE, engineering and administrative controls to be used to ensure the safety of this operation. Between 1 and 7 days before this task the Operations Technician Supervisor or the Lead Tech shall review the proposed steps with the ES&H Team (including a minimum of the H&S Technologist and disciplines from HP, IH, IS and EA) and obtain signatures indicating approval to proceed.

## Control Methods

Engineering Controls: Use hoods where possible, get portable ventilation if hood not protective.

		Hood/Fan No.	Portable Ventilation <b>yes</b>
Eyewash/Shower <b>X</b>		Interlocks	Other
Carcinogen Control Level:	Low	Medium <b>X</b>	High

Administrative Controls: Buddy system, see C-3 and D-3; C-4 and D-4.

Training Requirements: **See Section G of this SSH&SP**

Posting/Labelling:	HHC Poster <b>At entrance</b>	Other
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Others(s):

Personal Protective Equipment: Contact lens are prohibited during this task.

Gloves* <b>Heat resistant gloves covering the forarms, leather, Zetex, aluminoborosilicate fibers, Kevlar and aluminized coatings are preferred for thermal protection.</b>		Garments* <b>LLNL issued overalls, apron and hood. Cover ears to prevent flash burns and slag burns.</b>
Safety Shoe <b>yes</b>		Head Protection <b>none</b>
Shoe Covers <b>discuss with EH&amp;S Team 4</b>		Hearing Protection <b>none</b>
Eye Protection* <b>yes, welding goggles per 1910.133(a), filtered lens for protection against radiant energies.</b>		
Other <b>welding hood-protect ears</b>		

*Continued*

## Hazard Assessment and Control No.      HA#3 (continued)

### Control Methods (continued)

Respiratory Protection Requirements:\* **Protection factor of 50 or better.**

Air Purifying:

Disposable:	Dust/Mist	Paint/Pest.	Cartridge	Cannister
Half Mask			HEPA	Acid Gas
Full Face <b>X</b>			Org. Vapor	
PAPR <b>X belt mounted filter</b>	Mask/Hood/Helmet		Combination (specify) <b>HEPA Organic vapor- 3M welding respirator #9925.</b>	

Air Supplied:    possibly **X**

SCBA

Airline-Resp./Facepiece Type* <b>full face</b>	Air Source & Location <b>portable, request from B-326</b>
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Egress Requirement?

Frequency of Respirator Exchange (if not daily)

Issue Point Administrator    **Operations Tech Supervisor**

Badge No.    **TBD**

Issue Point Location    **Building 419 or Respiratory Shop**

Expiration/Update Date    **9-26-95**

**All respirator wears must be 1) medically approved for respirator wear, 2) quantitatively fit-tested by Respirator Shop onsite, and 3) trained per ANSI Standard Z88.2 (latest edition) and have no facial hair or clothing between the skin and the respirator seal.**

Decontamination Procedures:

***Whole body frisking with a LLNL "Blue Alpha" meter and a GM meter with a "pancake" probe is required for all workers before exiting established Exclusion Zones.***

### Additional Control Requirements/Procedures

**Obtain fire permit and contact H&S Tech 24-hr prior to task start up. Welders shall have a fire watch present.**

# Hazard Assessment and Control No.      HA#4

## Operation Description

Building <b>419</b>	Room/Area   124, 155	OSP/FSP/RWP No. or Con Space Permit   NA	Is One Required? <b>No</b>
ES&H Team No. <b>4</b>	Preparation Date <b>9-20-94</b>	Operation Start Date <b>9-26-94</b>	
Supervisor or Responsible Person <b>Support Services Supervisor, Operations Tech Supervisor; EAS Supervisor (for more details see Organizational Chart in H&amp;S Plan).</b>		Badge No. <b>TBD</b>	Phone/Pager No. <b>2-1807</b>
Operation Code (s)* <b>Wet wipe, wash down and remove slurry, disassemble &amp;pkge.</b>	Hours/Day <b>4-8 varies</b>	Days/Year <b>2-4</b>	

Operation Description:    **The vapor blaster and electropolisher are deemed to be too contaminated to successfully decontaminate to below environmental levels of concern. Wet wipe external surfaces with water and detergent, avoid creating dust. Wash down inside residue and pump slurry out into EA-approved containers. Use wet methods as much as possible. Seal units with 6-mil plastic and duct tape. Dismantle unit with hand tools, wetting down bolts before applying torque. No cutting. Package per Environmental Analyst requirements.**

Personnel Involved Name(s)	LLNL Employee No.	Job Category Code*	Probability of Exposure (1-10;10 maximum)
<b>TBD</b>	<b>TBD</b>	<b>Hazardous Waste Tech (2)</b>	<b>8</b>
<b>TBD</b>	<b>TBD</b>	<b>EAS Techs (2)</b>	<b>5</b>
<b>TBD</b>	<b>TBD</b>	<b>Health &amp; Safety Technologist</b>	<b>3</b>
<b>TBD</b>	<b>TBD</b>	<b>Operations Tech Supervisor</b>	<b>2</b>

## Hazard Evaluation

**Hazard\*: Inhalation, ingestion, injection or skin absorption (iiisa) of toxic or radioactive materials (alpha, beta and gamma:  $\alpha$ ,  $\beta$ ,  $\gamma$ ) during wet wiping, dismantling and packaging may result in poisoning. As, Be, Cr, Cd, asbestos, and Ni are human carcinogens. Vapor blaster contains trace quantities of tritium, plutonium, uranium, mixed fission products and toxic metals (arsenic, beryllium, cadmium, chromium, lead, mercury, nickel, selenium, silver, and thallium). There is a substantial quantity of highly dispersible and probably respirable blasting agent residue in the vapor blaster plus a deposit of sludge. The bottom and back of the vapor blaster appears to be corroded away. May be unstable and may fall apart. See MSDSs in project file. For controls to prevent over exertion, cuts, spills, trips and fall hazards see section C-3 and D-4 of the SSH&SP. The electropolisher has deposits of chromium, copper and nickel phosphate salts; these are potentially incompatible with acids.**

*Continued*

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\* Refers to Items with Lookup Tables

## Hazard Assessment and Control No. HA#4 (continued)

### Hazard Evaluation (continued)

Potential for: IDLH		No	Oxygen Deficiency		No	Peroxide Formation		No
No.	Agent	Exposure: Fraction of Standard*	Exposure Type*	Exposure Pathway(s)*	Evaluation Type*	Current Standard	Reference Source*	
1	arsenic	<0.001X	8-hr PEL	iiisa	Qualitative	10 ug/m3	Fed OSHA	
2	alpha, $\alpha$ beta, $\beta$ gamma, $\gamma$	0.2-2 X DAC	annual	iiisa	Qualitative	2 mrem/yr	Rad Con Manual	
3	beryllium	<0.5 X <0.5 X	8-hr TWA 15" STEL	iisa	Qualitative	1 ug/m3	Draft DOE Order	
4	cadmium	<0.1 X	8-hr TWA	iiisa	Qualitative	5 ug/m3	OSHA	
5	chromium	<0.1X	8-hr TWA	iisa	Qualitative	50 ug/m3	DOE/ACGIH	
6	cobalt	<0.1	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA	
7	asbestos	<0.1	30" STEL	iiisa	Qualitative	2 f/cc	OSHA	
8	mercury	<0.5X	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA	
9	nickel	<0.1 X	8-hr TWA	iiisa	Qualitative	100 ug/m3	OSHA	
10	lead	<0.5 X	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA	
11	selenium	<0.1 X	8-hr TWA	iiisa	Qualitative	200 ug/m3	ACGIH	
12	silver (soluble)	<0.1 X	8-hr TWA	iiisa	Qualitative	10 ug/m3	ACGIH	
13	thallium	<0.1 X	8-hr TWA	iiisa	Qualitative	100 ug/m3	ACGIH	

Is Additional Monitoring Necessary? Yes **X** No Under Review

Rationale: Radionuclides will be monitored real time per standard operating procedures.

If the Answer is Yes, Also Complete the Following:

Monitoring Types(s):	Breathing Zone <b>X</b>	Area Sample	Ceiling	TWA	<b>X</b>
	STEL	Swipe	Bioassay	Other (specify)	

*Continued*

## Hazard Assessment and Control No.      **HA#4** (continued)

### Hazard Evaluation (continued)

Agent No.	Method*	Medical Surveillance	Date(s) for Initial Monitoring	Periodic Monitoring Frequency* *
<b>Pump metals</b>	<b>37 mm diameter, 0.8 u MCEF, 2LPM, ICP; AA. Mercury direct reading, use Jerome Instrument or equivalent.</b>	<b>no</b>	<b>All dry vapor blaster tasks</b>	<b>daily</b>
<b>Mercury</b>	<b>Use Jerome Instrument or equivalent.</b>	<b>no</b>	<b>All dry vapor blaster tasks.</b>	<b>daily</b>
<b>Alpha, tritium</b>				
<b>beta, gamma</b>				

Prepared By: Sarah G. Lane, Chris Miles

Approved By:

Industrial Hygienist

Approved By:

Health Physicist

### General Comments

The Operations Technician Supervisor or the Lead Tech assigned to this job shall provide a written description in chronological order of 1) the steps to be taken, 2) the chemicals and exact tools to be used (with the MSDSs), 3) the name and employee numbers of the individuals assigned, 4) the recognized hazards of each step, and 5) the PPE, engineering and administrative controls to be used to ensure the safety of this operation. Between 1 and 7 days before this task the Operations Technician Supervisor or the Lead Tech shall review the proposed steps with the ES&H Team (including a minimum of the H&S Technologist and disciplines from HP, IH, IS and EA) and obtain signatures indicating approval to proceed.

*Continued*

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\* Refers to Items with Lookup Tables

# Hazard Assessment and Control No. HA#4 (continued)

## Control Methods

Engineering Controls: Use hoods where possible.

Glovebox No.	Hood/Fan No.	Portable Ventilation <b>HEPA vacuum or HEPA'd fan with extendable ducting (similar to those used for asbestos jobs).</b>	
Eyewash/Shower <b>X</b>	Interlocks	Other	
Carcinogen Control Level:	Low	Medium <b>X</b>	High

Administrative Controls: Buddy system, see C-3 and D-3; C-4 and D-4.

Training Requirements: **See Section G of this SSH&SP**

Posting/Labeling:	HHC Poster <b>At entrance</b>	Other
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Others(s):

Personal Protective Equipment:

Gloves* <b>4-H, Silvershield, nitrile, neoprene, inner gloves must be water impermeable. Use leather for handling rough or sharp edges, if any.</b>	Garments* <b>LLNL issued tyvex overalls. Wear hood when vacuuming or collecting dispersible slurry. Tape closed cuffs and ankles.</b>
Safety Shoe <b>yes</b>	Head Protection <b>see above</b>
Shoe Covers <b>yes, disposable</b>	Hearing Protection <b>none</b>

Eye Protection\* **yes, safety glasses or face shield**

Other **none**

Respiratory Protection Requirements:\* Protection factor of at least 50, in case vapor blaster spills.

Air Purifying: **X**

Disposable:	Dust/Mist	Paint/Pest.	Cartridge	Cannister
Half Mask <b>electropolisher work only</b>	(X for	HEPA <b>X</b>	Acid Gas	
Full Face <b>X</b>	Org. Vapor			
PAPR	Mask/Hood/Helmet	Combination (specify)		

Air Supplied:

SCBA

Airline-Resp./Facepiece Type*	Air Source & Location
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Egress Requirement?

Frequency of Respirator Exchange (if not daily)

Issue Point Administrator	Badge No.
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Issue Point Location **Building 419 or Respiratory Shop**

Expiration/Update Date **9-26-95**

**All respirator wearers must be 1) medically approved for respirator wear, 2) quantitatively fit-tested by Respirator Shop onsite, and 3) trained per ANSI Standard Z88.2 (latest edition) and have no facial hair or clothing between the skin and the respirator seal.**

*Continued*

## Hazard Assessment and Control No.      HA#4 (continued)

### Decontamination:

Whole body frisking with a LLNL "Blue Alpha" meter and a GM meter with a "pancake" probe is required for all workers before exiting established Exclusion Zones.

Wash reusable PPE, reusable equipment and exposed body parts with damp towlettes. Wash hands and face with soap and water before leaving building.

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### Additional Control Requirements/Procedures

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# Hazard Assessment and Control No.      HA#5

## Operation Description

Building <b>419</b>	Room/Area <b>124,155,167</b>	OSP/FSP/RWP No. or Con Space Permit <b>NA</b>	Is One Required? <b>No</b>
ES&H Team No. <b>4</b>	Preparation Date <b>9-20-94</b>	Operation Start Date <b>9-26-94</b>	
Supervisor or Responsible Person <b>Support Services Supervisor, Operations Tech Supervisor; EAS Supervisor (for more details see Organizational Chart in H&amp;S Plan.)</b>		Badge No. <b>TBD</b>	Phone/Pager No. <b>2-1807</b>
Operation Code (s)* <b>Core</b>	Hours/Day <b>4-8 varies</b>		Days/Year <b>2-4</b>

Operation Description:    **Pull bulk and wipe samples from building surfaces: concrete floors, paint, tiles, wall board pipe insulation and the like. Using asbestos sampling techniques to reduce exposures.**

Personnel Involved Name(s)	LLNL Employee No.	Job Category Code*	Probability of Exposure (1-10;10 maximum)
<b>TBD</b>	<b>TBD</b>	<b>Hazardous Waste Tech (2)</b>	<b>8</b>
<b>TBD</b>	<b>TBD</b>	<b>EAS Techs (2)</b>	<b>5</b>
<b>TBD</b>	<b>TBD</b>	<b>Health &amp; Safety Technologist</b>	<b>3</b>
<b>TBD</b>	<b>TBD</b>	<b>Operations Tech Supervisor</b>	<b>2</b>

## Hazard Evaluation

Hazard\*: **Inhalation, ingestion, injection or skin absorption (iiisa) of toxic or radioactive materials (alpha, beta and gamma:  $\alpha$ ,  $\beta$ ,  $\gamma$ ) during core sampling of building structures including, thermal insulation, asbestos tiles, wall board & wall mud, concrete flooring, ceiling tiles may result in inhalation hazard or exposure to carcinogens. As, Be, Cr, Cd, asbestos, and Ni are human carcinogens. Building surfaces, tiles, paints and concrete may contain quantities of tritium, plutonium, uranium, mixed fission products and toxic metals (arsenic, beryllium, cadmium, chromium, lead, mercury, nickel, selenium, silver, and thallium). See MSDSs in project file. For controls to prevent over exertion, cuts, spills, trips and fall hazards see section C-3 and D-4 of the SSH&SP.**

*Continued*

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\* Refers to Items with Lookup Tables

## Hazard Assessment and Control No. HA#5 (continued)

### Hazard Evaluation (continued)

Potential for: IDLH <b>No</b> Oxygen Deficiency <b>No</b> Peroxide Formation <b>No</b>							
No.	Agent	Exposure: Fraction of Standard*	Exposure Type*	Exposure Pathway(s)*	Evaluation Type*	Current Standard	Reference Source*
1	arsenic	<0.001X	8-hr PEL	iiisa	Qualitative	10 ug/m3	Fed OSHA
2	alpha, α beta, β gamma, γ		annual	iiisa	Qualitative	2 mrem/yr	Rad Con Manual
3	beryllium	<0.5 X <0.5 X	8-hr TWA 15" STEL	iisa	Qualitative	1 ug/m3	Draft DOE Order
4	cadmium	<0.1 X	8-hr TWA	iiisa	Qualitative	5 ug/m3	OSHA
5	chromium	<0.1X	8-hr TWA	iisa	Qualitative	50 ug/m3	DOE/ACGIH
6	cobalt	<0.1	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA
7	asbestos	<0.01	30" STEL	iiisa	Qualitative	2 f/cc	OSHA
8	mercury	<0.5X	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA
9	nickel	<0.1 X	8-hr TWA	iiisa	Qualitative	100 ug/m3	OSHA
10	lead	<0.1 X	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA
11	selenium	<0.1 X	8-hr TWA	iiisa	Qualitative	200 ug/m3	ACGIH
12	silver (soluble)	<0.1 X	8-hr TWA	iiisa	Qualitative	10 ug/m3	ACGIH
13	thallium	<0.1 X	8-hr TWA	iiisa	Qualitative	100 ug/m3	ACGIH
Is Additional Monitoring Necessary?			Yes	No <b>x</b>	Under Review		

*Continued*

## Hazard Assessment and Control No. HA#5 (continued)

### Hazard Evaluation (continued)

Rationale: Radionuclides will be monitored real time per standard operating procedures.

If the Answer is Yes, Also Complete the Following:

Monitoring Types(s):	Breathing Zone <b>X</b>	Area Sample	Ceiling	TWA <b>X</b>
	STEL	Swipe	Bioassay	Other (specify)
Agent No.	Method*	Medical Surveillance	Date(s) for Initial Monitoring	Periodic Monitoring Frequency* *

Prepared By: Sarah G. Lane, Chris Miles

Approved By:

Industrial Hygienist

Approved By:

Health Physicist

### General Comments

The Operations Technician Supervisor or the Lead Tech assigned to this job shall provide a written description in chronological order of 1) the steps to be taken, 2) the chemicals and exact tools to be used (with the MSDSs), 3) the name and employee numbers of the individuals assigned, 4) the recognized hazards of each step, and 5) the PPE, engineering and administrative controls to be used to ensure the safety of this operation. Between 1 and 7 days before this task the Operations Technician Supervisor or the Lead Tech shall review the proposed steps with the ES&H Team (including a minimum of the H&S Technologist and disciplines from HP, IH, IS and EA) and obtain signatures indicating approval to proceed.

*Continued*

\* Refers to Items with Lookup Tables

## Hazard Assessment and Control No. HA#5 (continued)

Control Methods				
Engineering Controls: Use hoods where possible.				
Glovebox No.	Hood/Fan No.	Portable Ventilation <b>To avoid creating dust use wet methods or HEPA vacuum or HEPA'd fan with extendable ducting (similar to those used for asbestos jobs).</b>		
Eyewash/Shower <b>X</b>	Interlocks	Other		
Carcinogen Control Level:	Low	Medium <b>X</b>	High	
Administrative Controls: Buddy system, see C-3 and D-3; C-4 and D-4.				
Training Requirements: <b>See Section G of this SSH&amp;SP</b>				
Posting/Labelling:	HHC Poster <b>At entrance</b>	Other		
Others(s):				
Personal Protective Equipment:				
Gloves* <b>Latex gloves</b>		Garments* <b>LLNL lab coat</b>		
Safety Shoe <b>yes</b>		Head Protection <b>see above</b>		
Shoe Covers <b>yes, disposable</b>		Hearing Protection <b>none</b>		
Eye Protection* <b>yes, safety glasses or face shield</b>				
Other <b>none</b>				
Respiratory Protection Requirements:* <b>None for this task</b>				
Air Purifying:				
Disposable:	Dust/Mist	Paint/Pest.	Cartridge	Cannister
Half Mask			HEPA	Acid Gas
Full Face			Org. Vapor	
PAPR	Mask/Hood/Helmet		Combination (specify)	
Air Supplied:				
SCBA				
Airline-Resp./Facepiece Type*			Air Source & Location	
Egress Requirement?				
Frequency of Respirator Exchange (if not daily)				
Issue Point Administrator			Badge No.	
Issue Point Location <b>Building 419 or Respiratory Shop</b>				
Expiration/Update Date <b>9-26-95</b>				

*Continued*

## Hazard Assessment and Control No. HA#5 (continued)

All respirator wearers must be 1) medically approved for respirator wear, 2) quantitatively fit-tested by Respirator Shop onsite, and 3) trained per ANSI Standard Z88.2 (latest edition) and have no facial hair or clothing between the skin and the respirator seal.

Decontamination:

*Whole body frisking with a LLNL "Blue Alpha" meter and a GM meter with a "pancake" probe is required for all workers before exiting established Exclusion Zones.*

Wash reusable PPE, reusable equipment and exposed body parts with damp towlettes. Wash hands and face with soap and water before leaving building.

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### Additional Control Requirements/Procedures

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# Hazard Assessment and Control No.      HA#6

## Operation Description

Building <b>419</b>	Room/Area <b>155</b>	OSP/FSP/RWP No. or Con Space Permit <b>NA</b>	Is One Required? <b>No</b>
ES&H Team No. <b>4</b>	Preparation Date <b>9-20-94</b>	Operation Start Date <b>9-26-94</b>	
Supervisor or Responsible Person <b>Support Services Supervisor, Operations Tech Supervisor; EAS Supervisor (for more details see Organizational Chart in H&amp;S Plan).</b>		Badge No. <b>TBD</b>	Phone/Pager No. <b>2-1807</b>
Operation Code (s)* <b>Disassembly of bake-out oven.</b>	Hours/Day <b>4-8 varies</b>	Days/Year <b>4-8</b>	

Operation Description:   **Wet wipe only no other cleaning, unless specifies in a HA-disassemble  
bakeout oven and seal in plastic. Package for storage as mixed waste.**

Personnel Involved Name(s)	LLNL Employee No.	Job Category Code*	Probability of Exposure (1-10;10 maximum)
<b>TBD</b>	<b>TBD</b>	<b>Hazardous Waste Tech (2)</b>	<b>8</b>
<b>TBD</b>	<b>TBD</b>	<b>EAS Techs (2)</b>	<b>5</b>
<b>TBD</b>	<b>TBD</b>	<b>Health &amp; Safety Technologist</b>	<b>3</b>
<b>TBD</b>	<b>TBD</b>	<b>Operations Tech Supervisor</b>	<b>2</b>

## Hazard Evaluation

Hazard\*:   **Inhalation, ingestion, injection or skin absorption (iiisa) of mercury may result in poisoning  
or uptake of radioactive materials (mainly tritium). See MSDSs in project file. This activity may  
present over exertion, cuts, spills, trips and fall hazards see section C-3 and C-4 of the SSH&SP.**

Potential for:   IDLH <b>No</b>		Oxygen Deficiency <b>No</b>		Peroxide Formation <b>No</b>			
No.	Agent	Exposure: Fraction of Standard*	Exposure Type*	Exposure Pathway(s)*	Evaluation Type*	Current Standard	Reference Source*
1	<b>alpha, α beta, β gamma, γ</b>	<b>0.5- 1 X DAC</b>	<b>annual</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>2 mrem/yr</b>	<b>Rad Con Manual</b>
2	<b>mercury</b>	<b>&lt;0.5X</b>	<b>8-hr TWA</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>50 ug/m3</b>	<b>OSHA</b>

*Continued*

\* Refers to Items with Lookup Tables

## Hazard Assessment and Control No. HA#6 (continued)

### Hazard Evaluation (continued)

Is Additional Monitoring Necessary?	Yes	No <b>x</b>	Under Review
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Rationale: Radionuclides will be monitored real time per standard operating procedures.

If the Answer is Yes, Also Complete the Following:

Monitoring Types(s):	Breathing Zone <b>X</b>	Area Sample	Ceiling	TWA <b>X</b>
	STEL	Swipe	Bioassay	Other (specify)
Agent No.	Method*	Medical Surveillance	Date(s) for Initial Monitoring	Periodic Monitoring Frequency* *
<b>mercury</b>	<b>Jerome Instrument</b>	<b>no</b>	<b>first day</b>	<b>continuously</b>

Prepared By: Sarah G. Lane, Chris Miles

Approved By:

Industrial Hygienist

Approved By:

Health Physicist

### General Comments HA#6

The Operations Technician Supervisor or the Lead Tech assigned to this job shall provide a written description in chronological order of 1) the steps to be taken, 2) the chemicals and exact tools to be used (with the MSDs), 3) the name and employee numbers of the individuals assigned, 4) the recognized hazards of each step, and 5) the PPE, engineering and administrative controls to be used to ensure the safety of this operation. Between 1 and 7 days before this task the Operations Technician Supervisor or the Lead Tech shall review the proposed steps with the ES&H Team (including a minimum of the H&S Technologist and disciplines from HP, IH, IS and EA) and obtain signatures indicating approval to proceed.

### Control Methods

Engineering Controls: Use hoods where possible.

Glovebox No.	Hood/Fan No.	Portable Ventilation <b>To avoid creating dust use wet methods or HEPA'd fan with extendable ducting (similar to those used for asbestos jobs).</b>		
Eyewash/Shower <b>X</b>		Interlocks		Other
Carcinogen Control Level:	Low	Medium <b>X</b>	High	

*Continued*

\* Refers to Items with Lookup Tables

## Hazard Assessment and Control No. HA#6 (continued)

Control Methods (continued)				
Administrative Controls: Buddy system, see C-3 and D-3; C-4 and D-4.				
Training Requirements: <b>See Section G of this SSH&amp;SP</b>				
Posting/Labelling:	HHC Poster	<b>At entrance</b>	Other	
Others(s):				
Personal Protective Equipment:				
Gloves* <b>4-H, Silvershield, nitrile, neoprene. Use leather over one of the above for sharp or rough edges, if any.</b>			Garments* <b>LLNL issued tyvex overalls. Wear hood . Tape closed cuffs and ankles.</b>	
Safety Shoe <b>yes</b>			Head Protection <b>see above</b>	
Shoe Covers <b>yes, disposable</b>			Hearing Protection <b>none</b>	
Eye Protection* <b>yes, safety glasses or face shield</b>				
Other <b>none</b>				
Respiratory Protection Requirements:*				
Air Purifying:				
Disposable:	Dust/Mist	Paint/Pest.	Cartridge	Cannister
Half Mask <b>levels&lt;0.5 mg/m3 (instantaneously)</b>			<b>X at</b> HEPA	Acid Gas
Full Face <b>X at levels &lt;2.5 mg/m3 (instantaneously)</b>			Org. Vapor	
PAPR	Mask/Hood/Helmet		Combination (specify) <b>mercury HEPA</b>	
Air Supplied:				
SCBA				
Airline-Resp./Facepiece Type*			Air Source & Location	
Egress Requirement?				
Frequency of Respirator Exchange (if not daily)				
Issue Point Administrator			Badge No. <b>TBD</b>	
Issue Point Location <b>Building 419 or Respiratory Shop</b>				
Expiration/Update Date <b>9-26-95</b>				
<b>All respirator wearers must be 1) medically approved for respirator wear, 2) quantitatively fit-tested by Respirator Shop onsite, and 3) trained per ANSI Standard Z88.2 (latest edition) and have no facial hair or clothing between the skin and the respirator seal.</b>				
<b>Decontamination: Whole body frisking with a LLNL "Blue Alpha" meter and a GM meter with a "pancake" probe is required for all workers before exiting established Exclusion Zones.</b>				
<b>Wash reusable PPE, reusable equipment and exposed body parts with towlettes. Wash hands and face with soap and water before leaving building.</b>				
Additional Control Requirements/Procedures				

# Hazard Assessment and Control No.      HA#7

## Operation Description

Building <b>419</b>	Room/Area <b>124,155,167</b>	OSP/FSP/RWP No. or Con Space Permit <b>NA</b>	Is One Required? <b>No</b>
ES&H Team No. <b>4</b>	Preparation Date <b>9-20-94</b>	Operation Start Date <b>9-26-94</b>	
Supervisor or Responsible Person <b>Support Services Supervisor, Operations Tech Supervisor; EAS Supervisor (for more details see Organizational Chart in H&amp;S Plan).</b>		Badge No. <b>TBD</b>	Phone/Pager No. <b>2-1807</b>
Operation Code (s)* <b>Remove surface coatings/residue as a sample or due to identified contamination.</b>	Hours/Day <b>4-8 varies</b>	Days/Year <b>2-4</b>	

Operation Description:    **Removal or surface layers including paint, grease, residues. Scraping, brushing, steam cleaning. No asbestos removal work. No mercury work: above 20 ug/m3 see HA#6.**

Personnel Involved Name(s)	LLNL Employee No.	Job Category Code*	Probability of Exposure (1-10;10 maximum)
<b>TBD</b>	<b>TBD</b>	<b>Hazardous Waste Tech (2)</b>	<b>8</b>
<b>TBD</b>	<b>TBD</b>	<b>EAS Techs (2)</b>	<b>5</b>
<b>TBD</b>	<b>TBD</b>	<b>Health &amp; Safety Technologist</b>	<b>3</b>
<b>TBD</b>	<b>TBD</b>	<b>Operations Tech Supervisor</b>	<b>2</b>

## Hazard Evaluation

Hazard\*: Inhalation, ingestion, injection or skin absorption (iiisa) of toxic or radioactive materials (alpha, beta and gamma:  $\alpha$ ,  $\beta$ ,  $\gamma$ ) during surface removal-including, paint concrete flooring, ceiling tiles may result in inhalation hazard or exposure to carcinogens. As, Be, Cr, Cd, abestos, and Ni are human carcinogens. Building surfaces, tiles, paints and concrete may contain quantities of tritium, plutonium, uranium, mixed fission products and toxic metals (arsenic, beryllium, cadmium, chromium, lead, mercury, nickel, selenium, silver, and thallium). See MSDSs in project file. For discussion of industrial safety hazards see C-4. For controls to prevent over exertion, cuts, spills, trips and fall hazards see section D-3 and D-4 of the SSH&SP. \*\*\*\*Use of controls will prevent exposure.\*\*\*\*

*Continued*

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\* Refers to Items with Lookup Tables

## Hazard Assessment and Control No. HA#7 (continued)

Hazard Evaluation (continued)							
Potential for:		IDLH	No	Oxygen Deficiency	No	Peroxide Formation	No
No.	Agent	Exposure (no PPE): Fraction of Standard*	Exposure Category*	Exposure Pathway(s)*	Evaluation Type*	Current Standard	Reference Source*
1	arsenic	<0.1X	8-hr PEL	iiisa	Qualitative	10 ug/m3	Fed OSHA
2	alpha, $\alpha$ beta, $\beta$ gamma, $\gamma$	2-5 X back-ground	annual	iiisa	Qualitative	2 mrem/yr	Rad Con Manual
3	beryllium	<0.05 X <0.05 X	8-hr TWA 30" STEL Ceiling	iisa	Qualitative	1 ug/m3 5 ug/m3 25 ug/m3	Draft DOE OSHA OSHA
4	cadmium	<0.1 X	8-hr TWA	iiisa	Qualitative	5 ug/m3	OSHA
5	chromium	<0.1 X	8-hr TWA	iisa	Qualitative	50 ug/m3	DOE/ACGIH
6	cobalt	<0.1 X	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA
7	asbestos	<0.1 X	30" STEL	iiisa	Qualitative	2 f/cc	OSHA
8	mercury	<0.1 X	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA
9	nickel	<0.1 X	8-hr TWA	iiisa	Qualitative	100 ug/m3	OSHA
10	lead	<0.1 X	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA
11	selenium	<0.1 X	8-hr TWA	iiisa	Qualitative	200 ug/m3	ACGIH
12	silver (soluble)	<0.1 X	8-hr TWA	iiisa	Qualitative	10 ug/m3	ACGIH
13	thallium	<0.1 X	8-hr TWA	iiisa	Qualitative	100 ug/m3	ACGIH

*Continued*

## Hazard Assessment and Control No. HA#7 (continued)

### Hazard Evaluation (continued)

Is Additional Monitoring Necessary?	Yes <b>X</b>	No	Under Review
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Rationale: Radionuclides will be monitored real time per standard operating procedures.

If the Answer is Yes, Also Complete the Following:

Monitoring Types(s):	Breathing Zone <b>X</b>	Area Sample	Ceiling	TWA <b>X</b>
	STEL	Swipe	Bioassay	Other (specify)
Agent No.	Method*	Medical Surveillance	Date(s) for Initial Monitoring	Air Monitoring Frequency* *
<b>Pump metals</b>	<b>0.8u MCEF, 37mm diameter, 2 lpm flow rate; icp/aa</b>	<b>no</b>	<b>1st</b>	<b>see IH</b>
<b>Asbestos</b>	<b>personal air see above</b>	<b>no</b>	<b>TBD</b>	<b>see IH</b>

Prepared By: Sarah G. Lane, Chris Miles

Approved By: \_\_\_\_\_

Industrial Hygienist

Approved By: \_\_\_\_\_

Health Physicist

### General Comments

The Operations Technician Supervisor or the Lead Tech assigned to this job shall provide a written description in chronological order of 1) the steps to be taken, 2) the chemicals (with the MSDSs) and exact tools to be used, 3) the name and employee numbers of the individuals assigned, 4) the recognized hazards of each step, and 5) the PPE, engineering and administrative controls to be used to ensure the safety of this operation. Between 1 and 7 days before this task the Operations Technician Supervisor or the Lead Tech shall review the proposed steps with the ES&H Team (including a minimum of the H&S Technologist and disciplines from HP, IH, IS and EA) and obtain signatures indicating approval to proceed.

*Continued*

\* Refers to Items with Lookup Tables

# Hazard Assessment and Control No. HA#7 (continued)

## Control Methods

Engineering Controls: Use hoods where possible.

Glovebox No.	Hood/Fan No.	Portable Ventilation <b>To avoid creating dust use wet methods and HEPA vacuum or HEPA'd fan with extendable ducting (similar to those used for asbestos jobs).</b>
Eyewash/Shower <b>X</b>	Interlocks	Other
Carcinogen Control Level:	Low	Medium <b>X</b> High

Administrative Controls: Buddy system, see C-3 and D-3; C-4 and D-4.

Training Requirements: **See Section G of this SSH&SP**

Posting/Labelling:	HHC Poster <b>At entrance</b>	Other
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Others(s):

Personal Protective Equipment:

Gloves* <b>4-H, Silvershield, nitrile, neoprene, inner gloves must be water impermeable. Ok to use latex under other glove. Use leather outer gloves for sharp edges, if any.</b>	Garments* <b>LLNL issued tyvex overalls.</b>
Safety Shoe <b>yes</b>	Head Protection <b>see above</b>
Shoe Covers <b>yes, disposable</b>	Hearing Protection <b>none</b>
Eye Protection* <b>yes, safety glasses or face shield</b>	

Respiratory Protection Requirements:\*

Air Purifying:

Disposable:	Dust/Mist	Paint/Pest.	Cartridge	Cannister
Half Mask <b>sampling</b>		<b>X for</b>	HEPA <b>X</b>	Acid Gas
Full Face <b>X for contamination removal</b>			Org. Vapor	
PAPR	Mask/Hood/Helmet		Combination (specify)	

Air Supplied:

SCBA

Airline-Resp./Facepiece Type*	Air Source & Location
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Egress Requirement?

Frequency of Respirator Exchange (if not daily)

Issue Point Administrator	Badge No.
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Issue Point Location **Building 419 or Respiratory Shop**

Expiration/Update Date **9-26-95**

*Continued*

## Hazard Assessment and Control No. HA#7 (continued)

All respirator wearers must be 1) medically approved for respirator wear, 2) quantitatively fit-tested by Respirator Shop onsite, and 3) trained per ANSI Standard Z88.2 (latest edition) and have no facial hair or clothing between the skin and the respirator seal.

Decontamination:

Whole body frisking with a LLNL "Blue Alpha" meter and a GM meter with a "pancake" probe is required for all workers before exiting established Exclusion Zones.

Wash reusable PPE, reusable equipment and exposed body parts with damp paper towel. Wash hands and face with soap and water before leaving building.

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### Additional Control Requirements/Procedures

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# Hazard Assessment and Control No.      HA#8

## Operation Description

Building <b>419</b>	Room/Area   124,155,167	OSP/FSP/RWP No. or Con Space Permit   NA	Is One Required? <b>No</b>
ES&H Team No. <b>4</b>	Preparation Date <b>9-20-94</b>	Operation Start Date <b>9-26-94</b>	
Supervisor or Responsible Person <b>Operations Tech Supervisor; EAS Supervisor</b>		Badge No. <b>TBD</b>	Phone/Pager No. <b>2-1807</b>
Operation Code (s)* <b>Using TLC Stripable paint, remove radioactive and toxic metal contamination.</b>		Hours/Day <b>4-8 varies</b>	Days/Year <b>2-4</b>

Operation Description:   **Removal or surface contamination by applying TLC stripable paint and peeling up. Apply no more than 250 square feet of area per day.**

Personnel Involved Name(s)	LLNL Employee No.	Job Category Code*	Probability of Exposure (1-10;10 maximum)
<b>TBD</b>	<b>TBD</b>	<b>HW Tech (2)</b>	<b>8</b>
<b>TBD</b>	<b>TBD</b>	<b>EAS Techs (2)</b>	<b>5</b>
<b>TBD</b>	<b>TBD</b>	<b>H&amp;S Technologist</b>	<b>3</b>
<b>TBD</b>	<b>TBD</b>	<b>Tech Supervisor</b>	<b>2</b>

## Hazard Evaluation

Hazard\*:   **Inhalation, ingestion, injection or skin absorption (iisa) of ammonia. See MSDSs in project file. For discussion of industrial safety hazards see C-4. For controls to prevent over exertion, cuts, spills, trips and fall hazards see section D-3 and D-4 of the SSH&SP. \*\*\*\*Use of controls will prevent exposure.\*\*\*\***

Potential for:		IDLH <b>No</b>	Oxygen Deficiency <b>No</b>		Peroxide Formation <b>No</b>		
No.	Agent	Exposure (no PPE): Fraction of Standard*	Exposure Category*	Exposure Pathway(s)*	Evaluation Type*	Current Standard	Reference Source*
1	<b>arsenic</b>	<b>&lt;0.1X</b>	<b>8-hr PEL</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>10 ug/m3</b>	<b>Fed OSHA</b>
2	<b>alpha, α beta, β gamma, γ</b>	<b>2-5 X back- ground</b>	<b>annual</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>2 mrem/yr.</b>	<b>Rad Con Manual</b>
3	<b>beryllium</b>	<b>&lt;0.05 X</b>	<b>30"STEL Ceiling</b>	<b>iisa</b>	<b>Qualitative</b>	<b>5 ug/m3 25 ug/m3</b>	<b>OSHA OSHA</b>
4	<b>cadmium</b>	<b>&lt;0.1 X</b>	<b>8-hr TWA</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>5 ug/m3</b>	<b>OSHA</b>
5	<b>chromium</b>	<b>&lt;0.1 X</b>	<b>8-hr TWA</b>	<b>iisa</b>	<b>Qualitative</b>	<b>50 ug/m3</b>	<b>DOE/ACGIH</b>
6	<b>cobalt</b>	<b>&lt;0.1 X</b>	<b>8-hr TWA</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>50 ug/m3</b>	<b>OSHA</b>
7	<b>asbestos</b>	<b>&lt;0.1 X</b>	<b>30" STEL</b>	<b>iiisa</b>	<b>Qualitative</b>	<b>2 f/cc</b>	<b>OSHA</b>

*Continued*

\* Refers to Items with Lookup Tables

## Hazard Assessment and Control No. HA#8 (continued)

### Hazard Evaluation (continued)

No.	Agent	Exposure (no PPE): Fraction of Standard*	Exposure Category*	Exposure Pathway(s)*	Evaluation Type*	Current Standard	Reference Source*
8	mercury	<0.1 X	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA
9	nickel	<0.1 X	8-hr TWA	iiisa	Qualitative	100 ug/m3	OSHA
10	lead	<0.1 X	8-hr TWA	iiisa	Qualitative	50 ug/m3	OSHA
11	ammonia	<250 mg/m3	8-hr TWA 15" STEL	iiisa	Worst-case	17 mg/m3 24 mg/m3	ACGIH

Is Additional Monitoring Necessary?    Yes **X**    No    Under Review

Rationale:

If the Answer is Yes, Also Complete the Following:

Monitoring Types(s):	Breathing Zone <b>X</b>	Area Sample	Ceiling <b>X</b>	TWA
	STEL	Swipe	Bioassay	Other (specify)
Agent No.	Method*	Medical Surveillance	Date(s) for Initial Monitoring	Air Monitoring Frequency* *
<b>Ammonia</b>	<b>Draeger tubes</b>	<b>no</b>	<b>first day first hr</b>	<b>15 minutes</b>

Prepared By: Sarah G. Lane, Chris Miles

Approved By:

Industrial Hygienist

Approved By:

Health Physicist

### General Comments

The Operations Technician Supervisor or the Lead Tech assigned to this job shall provide a written description in chronological order of 1) the steps to be taken, 2) the chemicals (with the MSDSs) and exact tools to be used, 3) the name and employee numbers of the individuals assigned, 4) the recognized hazards of each step, and 5) the PPE, engineering and administrative controls to be used to ensure the safety of this operation. Between 1 and 7 days before this task the Operations Technician Supervisor or the Lead Tech shall review the proposed steps with the ES&H Team (including a minimum of the H&S Technologist and disciplines from HP, IH, IS and EA) and obtain signatures indicating approval to proceed.

*Continued*

\* Refers to Items with Lookup Tables

## Hazard Assessment and Control No. HA#8 (continued)

Control Methods				
Engineering Controls: Use hoods where possible.				
Glove box No.	Hood/Fan No.	Portable Ventilation Use portable HEPA'd fan 2000 CFM vent to outside		
Eyewash/Shower <b>X</b>		Interlocks	Other	
Carcinogen Control Level:	Low <b>X</b>	Medium	High	
Administrative Controls: Buddy system, see C-3 and D-3; C-4 and D-4.				
Training Requirements: <b>See Section G of this SSH&amp;SP</b>				
Posting/Labeling:	HHC Poster <b>At entrance</b>	Other		
Others(s):				
Personal Protective Equipment:				
Gloves* <b>4-H, Silvershield, nitrile, neoprene, inner gloves must be water impermeable. Ok to use latex under other glove.</b>		Garments* <b>LLNL issued tyvex overalls.</b>		
Safety Shoe <b>yes</b>		Head Protection <b>see above</b>		
Shoe Covers <b>yes, disposable</b>		Hearing Protection <b>none</b>		
Eye Protection* <b>Full face respirator will provide</b>				
Respiratory Protection Requirements:*				
Air Purifying:				
Disposable:	Dust/Mist	Paint/Pest.	Cartridge	Canister
Half Mask			HEPA <b>X</b>	Acid Gas
Full Face <b>X</b>			Org. Vapor <b>X</b>	
PAPR	Mask/Hood/Helmet		Combination (specify) <b>X ammonia/hepa</b>	
Air Supplied:				
SCBA				
Airline-Resp./Face piece Type*			Air Source & Location	
Egress Requirement?				
Frequency of Respirator Exchange (if not daily)				
Issue Point Administrator			Badge No.	
Issue Point Location <b>Building 419 or Respiratory Shop</b>				
Expiration/Update Date <b>9-26-95</b>				

*Continued*

## **Hazard Assessment and Control No. HA#8 (continued)**

All respirator wearers must be 1) medically approved for respirator wear, 2) quantitatively fit-tested by Respirator Shop onsite, and 3) trained per ANSI Standard Z88.2 (latest edition) and have no facial hair or clothing between the skin and the respirator seal.

### **Decontamination:**

Whole body frisking with a LLNL "Blue Alpha" meter and a GM meter with a "pancake" probe is required for all workers before exiting established Exclusion Zones.

Wash reusable PPE, reusable equipment and exposed body parts with damp paper towel. Wash hands and face with soap and water before leaving building.

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### **Additional Control Requirements/Procedures**

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Use in hood whenever possible or provide additional ventilation. There is 25 ppm ammonia in paint. 5 gallons covers 250 ft<sup>2</sup>. 5 gallons \* 20 lb./gal. = 100 lbs.= 45.4 kg. 45.4 kg \* 0.0025=0.1135 kg ammonia or 113.5 g (assume all evaporates in 1 hour. DO NOT APPLY more than 5 gallons per day or cover more than 250 sq. ft per day. Do not apply heat to accelerate drying.

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## **Attachment 3: Building 419 Emergency Response Plan**





**Environmental Protection Department**  
**Hazardous Waste Management Division**

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**Attachment 3**  
**Building 419 Facility**  
**Emergency Response Plan**

to

**Appendix B**  
**Health and Safety Plan**

to the

**Closure Plan for the Building 419**  
**Size Reduction and Solidification Units**

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**Lawrence Livermore National Laboratory**

**University of California   Livermore, California 94551**



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## **BUILDING 419 FACILITY EMERGENCY RESPONSE PLAN**

### **1. INTRODUCTION**

#### **1.1 Purpose**

This Emergency Response Plan was prepared to minimize hazards to human health and the environment from fires, explosions, and unplanned sudden or nonsudden releases (due to earthquakes, power outages, or other emergencies) of hazardous, radioactive, or mixed waste constituents to the air, soil, ground water, or surface water from Building 419. This Facility is operated by the Hazardous Waste Management Division at Lawrence Livermore National Laboratory (LLNL). This Plan outlines the responsibilities and procedures to be followed in the event of an emergency at this facility.

This Emergency Response Plan is designed to be used in conjunction with the current edition of the LLNL *Emergency Preparedness Plan*. The *Emergency Preparedness Plan* is a Laboratory-wide Emergency Response Plan that includes Implementation Procedures for response to major accidents and disasters, including fires, explosions, hazardous, radioactive, or mixed material or waste spills, and other emergencies that are mitigated by the LLNL Fire Department. Both the *Emergency Preparedness Plan* and the *Emergency Preparedness Plan Implementation Procedures* will be collectively referred to as the *Emergency Preparedness Plan* throughout this document.

#### **1.2 Scope of the Plan**

This Emergency Response Plan was prepared specifically for Building 419. This Plan identifies personnel responsibilities, emergency equipment, and required actions necessary to mitigate accidents within this facility. It is intended to instruct and prepare Hazardous Waste Management Division personnel for potential emergencies.

The Plan specifically defines which types of emergencies must be mitigated by the LLNL Fire Department and those that may be remedied by Hazardous Waste Management Division personnel. This distinction is accomplished by classifying the particular accident in accordance with the following four incident levels:

- Level 1 incident (no emergency): A Level 1 incident is a minor problem or incident not involving emergency response units external to the Hazardous Waste Management Division. This type of incident may be characterized by a minor injury requiring first-aid treatment or a minor hazardous, radioactive, or mixed material (waste) spill. The Hazardous Waste Management Building 419 Facility Operations Supervisor acts as the Incident Commander.
- Level 2 incident (minor emergency): A Level 2 incident may be a single fire, a moderate hazardous, radioactive, or mixed material (waste) spill, or an injury requiring medical treatment. The LLNL Fire Department Chief acts as the Incident Commander. The Laboratory Emergency Duty Officer is informed.
- Level 3 incident (major emergency): A Level 3 incident includes emergencies such as multiple fires; an explosion; a large hazardous, radioactive, or mixed material (waste) release; or a moderate earthquake. An incident at this level would require site-wide commitment and management of LLNL resources. The LLNL Emergency Duty Officer is in charge of the overall incident. The Incident Commander (LLNL Fire Chief) is in charge of the incident scene.

- Level 4 incident (disaster): A Level 4 incident includes emergencies such as a severe earthquake, a major fire, a major hazardous, radioactive, or mixed material (waste) release with off-site effects, or an explosion with major damage. These incidents cause extensive injuries, death, property damage, or security problems. The Crisis Manager is in charge of the overall incident. The Incident Commander (LLNL Fire Chief) is in charge of the incident scene.

Hazardous Waste Management Division personnel may respond to a Level 1 incident without notifying the LLNL Fire Department.

<p><b>The LLNL Fire Department must be called whenever a Level 2, 3, or 4 incident occurs. Call ext 911.</b></p>
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## 2. RESPONSIBILITIES DURING AN EMERGENCY

This section presents the responsibilities of Hazardous Waste Management Division emergency response staff and support organizations in addition to the LLNL Emergency Response Organization. Individuals designated in Table 2-1 may be selected as Emergency Coordinator during an emergency incident. For Level 1 incidents, Building 419 Supervisor or designated alternate is the Emergency Coordinator; for Level 2, 3, or 4 incidents, a Fire Chief is the Emergency Coordinator.

**Table 2-1 Emergency Call List**

Hazardous Waste Management Division*		Duty Fire Chiefs†		
Title	Facility Supervisor	Fire Chief (primary)	Assistant Fire Chief (alt. 1)	Assistant Fire Chief (alt. 2)
Name	Scott Kidd	John Sharry	John Loverin	Jerry Sandoval
Dial Page	37777-01228	37700-03108	37700-03128	37700-03178
Work Phone	(510) 422-1253	(510) 423-2481	(510) 422-5243	(510) 422-7748
Work Address	7000 East Ave Livermore, CA 94551	7000 East Ave Livermore, CA 94551	7000 East Ave Livermore, CA 94551	7000 East Ave Livermore, CA 94551
L-Code	L-620	L-388	L-388	L-388
Note: For assistance during off-shift hours, contact Fire Department Dispatcher on ext 911.				

\* Emergency Coordinator for Level 1 Incidents.

† Emergency Coordinator for Level 2, 3, or 4 Incidents.

### 2.1 Emergency Coordinator (LLNL Incident Commander)

The LLNL Incident Commander fulfills the responsibility of Emergency Coordinator pursuant to State and Federal regulations. The Incident Commander coordinates all emergency responses.

Level 1 incidents are handled by the Hazardous Waste Management Division with the Building 419 Operations Supervisor or alternate as the Incident Commander. He or she is responsible for assessing emergency conditions, safeguarding Building 419 Facility personnel, making the initial emergency classification, initiating on-site response activities, and requesting help from support organizations. He or she coordinates all emergency response measures and has the authority to commit resources needed to mitigate Level 1 incidents as described in this Emergency Response Plan. Response procedures for Level 1 incidents are included in this document to provide guidance for Hazardous Waste Management Division personnel. This Emergency Response Plan is not considered to be implemented for Level 1 incident mitigation.

For Level 2, 3, and 4 incidents, the Fire Department is contacted. For these emergencies, the first or senior Fire Department Officer dispatched to or present at the incident site becomes the Incident Commander until relieved by a Chief Officer. The Chief Officer then becomes the Incident Commander. The Incident Commander is responsible for assessing the emergency conditions, making the initial emergency level classification, initiating on-site response activities, and requesting support from off-site organizations. On-scene operational control for life safety, rescue, fire control and extinguishment, spill control and containment, and property conservation and salvage is provided by the Incident Commander at all times. He or she also directs the efforts

of the Emergency Response Organization to identify material released and to assess potential or actual health consequences. The Incident Commander coordinates all emergency response measures and has the authority to commit resources needed to carry out this Emergency Response Plan and the LLNL *Emergency Preparedness Plan*.

Personnel qualified to act as Incident Commander are always on the premises. The LLNL Fire Department maintains a 24-hr staff and is available to assume the role of Incident Commander at all times, for all level incidents.

## **2.2 Hazardous Waste Management Division Emergency Contacts**

Hazardous Waste Management Division personnel are prepared to respond in an emergency, including the Building 419 Supervisor, Operations Technicians and Technologists, and Waste Operations Section Leader. Other Hazardous Waste Management Division personnel with responsibilities that affect the emergency response capability include the Support Services Supervisor and the Facilities and Assessments Section Leader.

For Level 1 incidents, Hazardous Waste Management Division can request assistance from the emergency support organizations, which include: the Hazards Control Environmental Safety and Health (ES&H) Team, the Environmental Operations Group Environmental Analyst, and the Environmental Monitoring and Analysis Division.

The Hazardous Waste Management Division also provides equipment and personnel to support the Incident Commander (Fire Chief), when requested, for spill containment and cleanup during Level 2, 3, and 4 incidents occurring on-site. The Hazardous Waste Management Division maintains a ready supply of emergency response equipment in a specially equipped spill response trailer.

### **2.2.1 Hazardous Waste Management Division Building 419 Facility Supervisor or Alternate**

Specifically, the following are the responsibilities of the Hazardous Waste Management Division Facility Supervisor (or alternate) for all emergency incidents in Building 419:

- For Level 1 incidents:
  - Maintains own safety and that of all personnel in the area.
  - Acts as the Incident Commander, as described in Section 2.1.
  - Ensures that the Environmental Operations Group Environmental Analyst and the Health and Safety Technician have been notified.
  - Ensures that all normal waste handling operations cease in areas within and bordering the spill until cleanup procedures are completed to avoid contact of incompatible waste with released material.
  - Directs the collection and containment of released wastes and the removal or isolation of incompatible waste containers.
  - Ensures that all spills are internally reported by Hazardous Waste Management Division Operations Technicians/Technologists.
  - Monitors for leaks, pressure build-up, gas generation, or ruptures in valves, pipes, or other equipment, wherever applicable.

- Provides for treatment, storage, or disposal of recovered hazardous, radioactive, or mixed wastes or material, contaminated soil, or surface water, in accordance with all applicable regulations.
- Ensures that all emergency equipment listed in the Emergency Response Plan is cleaned and fit for its intended use before operations are resumed.
- For Level, 2, 3, and 4 incidents:
  - Evaluates the immediate scope of the incident.
  - Initiates evacuation of facility personnel, if necessary (activates Building 419 Facility paging system).
  - Notifies the LLNL Fire Department.
  - Takes appropriate action to safeguard Building 419 Facility personnel.
  - Ensures that the Environmental Operations Group Environmental Analyst and the Health and Safety Technician have been notified.
  - Directs area personnel in accordance with the Emergency Response Plan as temporary Incident Commander until the Fire Department and the official Incident Commander arrive.
  - Ensures that all normal waste handling operations cease in areas within and bordering the spill until cleanup procedures are completed to avoid contact of incompatible waste with released material.
  - Assists the Incident Commander and provides appropriate direction to Building 419 Facility personnel who are lending support.
  - Ensures that all Hazardous Waste Management Division emergency equipment listed in the Emergency Response Plan is cleaned and fit for its intended use before operations are resumed.
- Preventative maintenance responsibility:
  - Ensures that all emergency response equipment and spill kit contents are properly maintained, sufficiently stocked, and in good working order.

#### 2.2.2 Hazardous Waste Management Division Operations Technicians and Technologists

The following are the responsibilities of the Operations Technicians and Technologists during an emergency incident:

- For a Level 1 incident:
  - Maintain own safety.
  - Observe the two-person rule—never work alone.
  - For spill response, follow the Ten-Step Plan (described in Section 3.2.6); listen carefully to instructions from the Incident Commander (Building 419 Facility Operations Supervisor or alternate).
  - Immediately report any injuries, incidents, and unsafe conditions to the Incident Commander.

- Stop any Hazardous Waste Management Division spill cleanup operation when there appears to be danger to personnel, property, or the environment, and call the LLNL Fire Department for assistance.
- Ensure that Level 1 spills are internally reported.
- For Level 2, 3, and 4 incidents:
  - Maintain own safety.
  - Notify Building 419 Facility Supervisor or alternate (in case of extremely hazardous, life threatening situation, immediately notify facility personnel on Building 419 paging system).
  - For Level 2, 3, or 4 spills, if safe, follow the first five steps of the Ten-Step Plan (described in Section 3.2.6) while waiting for the LLNL Fire Department to arrive.
  - Observe the two-person rule—never work alone.
  - Provide assistance to the Incident Commander (LLNL Fire Chief), as requested, for spill cleanup.
  - Listen carefully to instructions from the Incident Commander and Building 419 Facility Supervisor.
  - Ensure that spill residue and contaminated disposable clothing and equipment are discarded appropriately.
  - Ensure that all incidents are properly documented.

2.2.3            Hazardous Waste Management Division Waste Operations  
Section Leader

The following are the responsibilities of the Waste Operations Section Leader during an emergency incident:

- Coordinates remediation efforts as directed by the Incident Commander or the Environmental Operations Group Environmental Analyst.
- Provides technical support to the Emergency Control Organization regarding Hazardous Waste Management facilities and operations.
- Ensures that any reportable spill is properly documented and notification is given to the Environmental Protection Department management.

2.2.4            Hazardous Waste Management Division Support Services Supervisor

The Hazardous Waste Management Division Support Services Supervisor is responsible for maintaining the operational readiness of the emergency equipment at Building 419 to ensure proper working order.

2.2.5            Hazardous Waste Management Division Facilities and Assessments  
Section Leader

The Hazardous Waste Management Division Facilities and Assessments Section Leader is responsible for preparing, reviewing, and updating the Emergency Response Plan.

## 2.3 Support Organizations

### 2.3.1 Hazards Control ES&H Team

Professionals from the Hazards Control ES&H Team may be called in to advise and support the Hazardous Waste Management Division in mitigating Level 1 emergency incidents. This team consists of specialists in the following fields: Industrial Hygiene, Industrial Safety, Health Physics, Environmental Protection, Explosives Safety, Fire Protection Engineering, and Criticality Safety.

The Incident Commander for Level 2, 3, and 4 incidents can also call on the Hazards Control ES&H Team as provided above for professional advice and, in addition, can activate the Hazard Control Satellite Command Center and the Emergency Management Center (EOC) if additional support is needed. This organization is described in more detail in the LLNL *Emergency Preparedness Plan*.

#### 2.3.1.1 *Hazards Control ES&H Team Leader*

The following are the responsibilities of the Hazards Control ES&H Team Leader.

For Level 1 incidents:

- Helps dispatch the appropriate Hazards Control Department representatives to advise and support Hazardous Waste Management Division in mitigating Level 1 emergency incidents (these include, but are not limited to, an Industrial Hygienist for chemical hazards assessments and personal protective equipment (PPE) advice and a Health Physicist for assessment of and advice regarding released radioactive or mixed wastes).

For a Level 2, 3, or 4 incident:

- Assembles the ES&H Team at the Command Post or at a specified Assembly Area.
- Relays the field status of the emergency response to the Operational Safety Division Leader or directly to the Incident Commander.
- Coordinates team member responses in their respective disciplines..
- Provides a unified assessment of field conditions and actual or potential health effects based on team member evaluation of the incident.
- Advises the Emergency Response Organization on appropriate protective measures based on field evaluations.

#### 2.3.1.2 *Environmental Operations Group Environmental Analyst*

The Environmental Operations Group Environmental Analyst represents the Environmental Protection Department on the Hazards Control ES&H Team. This individual supports the Hazardous Waste Management Division. During an incident (Levels 1 through 4), the responsibilities of the Environmental Analyst of the Environmental Operations Group are:

- Responds to emergency incidents and determines the actual or potential environmental impacts.
- Directs and assists with the collection of samples in an area with a contaminated spill, collects samples after cleanup to verify that cleanup is complete, and determines whether remediation work is necessary.
- Prepares an Environmental Protection Department Environmental Incident Report.

- Determines whether the release needs to be reported to regulatory agencies.
- Notifies LLNL management and/or the appropriate regulatory agencies of the incident as directed by the Operations and Regulatory Affairs Division Leader.

#### 2.3.2 Environmental Monitoring and Analysis Division

The Environmental Monitoring and Analysis Division of the Environmental Protection Department supports and assists LLNL organizations in conducting environmental monitoring of all media to verify compliance with established LLNL activities. They may support Hazardous Waste Management Division for Level 1 incidents and the Fire Department for Level 2, 3, and 4 incidents. The Environmental Monitoring and Analysis Division performs the following functions as related to emergency incident response:

- Provides fixed and portable air monitoring and modeling to determine airborne releases
- Performs monitoring and sample analysis (at a State-certified laboratory) of various environmental media to assess the impact of the incident on the environment, as required by the U.S. Environmental Protection Agency and State of California Department of Toxic Substances Control regulations and U.S. Department of Energy (DOE) Orders.

### 2.4 **LLNL Fire Safety Division—Emergency Operations Group**

The LLNL Fire Safety Division (Fire Department) is called for Level 2, 3, and 4 incidents. The Fire Safety Division is composed of an Administrative Group and an Emergency Operations Group. The Emergency Operations Group acts as the first responder to Level 2, 3, and 4 incidents and is responsible for invoking the incident-command organization.

The first fire officer to arrive at the scene assumes the Incident Commander role until relieved by a Chief Officer. The Incident Commander's specific responsibilities during a Level 2, 3, or 4 incident are as follows:

- Acts as Incident Commander as described in Section 2.1 for Level 2, 3, and 4 incidents (and as described in the *Emergency Preparedness Plan*).
- Activates the LLNL Emergency Paging System to notify personnel in selected areas of LLNL or the entire LLNL population, if necessary. Initiates evacuation of personnel, if appropriate.
- Notifies appropriate State or local agencies with designated response roles if their help is needed (enlists support from agencies that participate in the Mutual Aid Agreement. If necessary, ensures that the State Office of Emergency Services has been notified).
- Prevents the occurrence, recurrence, and spread of fire, explosion, and waste release by stopping all waste handling processes and operations in the area.
- Directs the collection and containment of released waste and the removal or isolation of incompatible waste containers.
- Directs monitoring activities for leaks, pressure buildups, gas generation, or ruptures in valves, pipes, or other equipment, whenever appropriate.

- Ensures that all recovered wastes or material, contaminated soil, or surface water is treated, stored, or disposed of in accordance with all applicable regulations (may delegate this responsibility to the Building 419 Supervisor).
- Ensures that all emergency equipment used to mitigate the incident is cleaned and fit for its intended use before operations are resumed (may delegate the cleanup of Hazardous Waste Management Division emergency equipment to Building 419 Supervisor).
- Ensures that all required notifications to outside agencies take place.

The LLNL Emergency Response Organization is discussed in detail in the LLNL *Emergency Preparedness Plan*.

### 3. EMERGENCY CONTROL PROCEDURES

Response to an emergency at Building 419 is designed to be at a level appropriate to the incident. The transition from one level of emergency to another must be automatic and keyed to well-defined criteria. Emergency action levels are defined based on the event and the potential hazard to on-site personnel and off-site persons. The LLNL and DOE emergency classification schemes are defined in Section 1.2. The Hazardous Waste Management Division may respond to a Level 1 incident; the Fire Department will respond to Level 2, 3, or 4 incidents. To determine if an incident is more severe than Level 1, refer to the criteria in Section 1.2.

#### 3.1 LLNL Site-Wide Emergencies

LLNL maintains a Self-Help Program. Each department/division is required to prepare and keep its own Self-Help Plan, designed to collect and safeguard personnel and visitors during site-wide emergencies. Whenever a major emergency occurs and LLNL's Emergency Response Organization is fully committed, the Self-Help Plans are enacted.

LLNL is divided into multiple Self-Help Zones, each under the direction of a senior manager (Zone Supervisor). Within each zone are designated Assembly Points, where Assembly Point Leaders control the local emergencies while awaiting assistance from the Emergency Response Organization. The highest ranking individual at the Assembly Point is appointed leader. Personnel are instructed to meet at this Assembly Point whenever evacuations are necessary. Building 419 is located in Self-Help Zone 13 (see Figures 1 and 2). See Section 5 for more specific emergency evacuation instructions.

#### 3.2 Emergency Situations

The following sections describe the procedures for each of several emergency situations.

##### 3.2.1 Fire or Explosion

If a fire or explosion occurs, personnel should:

- Dial ext 911 and give the Emergency Dispatcher the following information:
  - Name.
  - Location of the fire (building, room, area, cross streets, or any other information that might help the emergency response personnel quickly locate the scene)
  - Nature of the fire (electrical, chemical, etc.).
  - Additional information that might affect the response personnel (severity of the fire, materials at risk in the immediate area).
- Remain on the phone to verify the information given to the Emergency Dispatcher and receive instructions.
- Notify supervisor.
- Isolate the emergency area.
- Give emergency aid to the injured.
- After performing the above steps, if a fire can be controlled with a fire extinguisher, an employee **trained** in using fire extinguishers **may** attempt to control the fire (see Section 4.3.1).

The Incident Commander (from the LLNL Fire Department) is responsible for controlling the incident, as described in Section 2.4.

### 3.2.2 Earthquakes

The following precautions should be taken during an earthquake:

- Remain calm, think through the consequences of any actions taken, and try to calm and reassure other individuals.
- Indoors, watch for falling light fixtures and other objects; if in danger, get under a table or desk in a corner away from the windows, or stand in a strong doorway; encourage others to follow your example; usually it is best not to run outside.
- Do not use the telephone unless you have an emergency; the telephone system, even after a minor earthquake, becomes overloaded with calls making it difficult for people with emergencies to place calls; wait at least 1/2 hr before calling home or making any other non-emergency calls.
- If you must leave the building, choose your exit as carefully as possible.
- Do not touch downed power lines or objects that are touching downed lines.
- Outside, avoid high buildings, walls, power poles, and other objects that could fall; do not run through streets; if possible, move to an open area away from all hazards.
- Follow instructions that may be given over the emergency public address system; if you are told to evacuate the building, go to the designated Assembly Point for your area unless directed otherwise (see Section 5).

After a major earthquake, determine if fellow workers are injured. If instructed to evacuate and if conditions are safe in that area, go to the Emergency Assembly Point. Then follow the instructions of the Assembly Point Leader. He or she will organize a sweep team to accomplish the tasks listed below. If evacuation is not ordered, then find a safe place and stay there until the emergency subsides. Then, if necessary, assist the Building 419 Supervisor or alternate or the Facility Coordinator in accomplishing the following tasks:

- Do not move seriously injured persons unless they are in immediate danger of further injury.
- Call the Emergency Dispatcher (ext 911) for emergency assistance.
- Check for fires or fire hazards, particularly in hazardous, radioactive, and mixed waste storage areas.
- Check utility lines and equipment for damage; shut off electrical power to equipment; do not use matches, lighters, or open-flame appliances or operate electrical appliances or switches until you are sure no flammable vapors are present.
- Inspect the facility to verify that there has been no damage to tanks, piping systems, containers, or storage areas; the area should be cordoned off to control access.
- Stop the source of any spills and provide containment of any spilled material.
- Assist in the cleanup of any spilled chemicals or other potentially harmful materials as directed in Section 3.2.6.
- Report any emergencies to the Emergency Dispatcher.

### 3.2.3 Power Outages

Routine waste management operations of this facility are conducted during daylight hours (8:00 a.m. to 5:00 p.m.), Monday through Friday, except on holidays.

A gas-powered portable generator and three floodlights are maintained in the Hazardous Waste Management Division's spill response trailer, which is located in the Area 612 Facility. This equipment is available for use during nonroutine waste management operations or emergency situations. The portable generator is serviced and tested once a month regardless of use.

An additional portable generator is maintained with additional floodlights and construction light strings in the Support Services Group equipment yard located north of Building 419. This generator is also tested and serviced once a month regardless of use. The generators, floodlights, and construction string lights are available as needed.

Employees also have access to flashlights to monitor the facility during a power outage. In the event that a power outage occurs at the same time as an indoor waste spill, a portable generator with accompanying floodlights is available for cleanup operations. On-line backup power sources are not available for Building 419. In the case of a power outage, all processes would stop until power was restored. This lack of backup power does not pose a threat, since none of the operations at Building 419 require power to prevent a release of hazardous substances.

Upon loss of power, employees should:

- Cease all work in the affected waste handling and processing areas.
- Secure all tools, equipment, and systems and leave them in an appropriate state for restoration of regular power.
- Leave the affected area, observing proper exit procedures (e.g., proper removal of protective clothing and protective equipment).
- Report to supervisor for instructions.

### 3.2.4 Container Failure

If a container or tank holding hazardous, radioactive, or mixed waste or material spills, leaks, or otherwise releases its contents to the environment and if the spill meet criteria for a small spill and there is no immediate threat to personnel safety, Hazardous Waste Management Division personnel will take immediate action to contain the release. Follow spill response procedures outlined in Section 3.2.6.

#### 3.2.4.1 *Procedures To Stop and Contain Waste*

When visual monitoring indicates that a leak or spill has occurred, a series of steps must be taken to evaluate the situation. These steps are structured to provide the appropriate actions to (1) minimize the environmental impact and (2) determine a course of action to remedy the problem.

The following actions are required when container failure is detected:

- Cease waste handling operations.
- Isolate or remove any containers of incompatible wastes from spill vicinity if contact is possible.
- Initiate spill response in accordance with Section 3.2.6.
- Use Drum Repair Kit for temporary drum repair, in accordance with Section 3.2.6.1 (Step 2).

- Place the damaged container into a compatible overpack drum or other suitable container when conditions are safe.

#### *3.2.4.2 Removal of Waste*

Liquid within secondary containment shall be removed in a timely manner. Large releases are pumped into appropriate containers and small releases are treated with absorbent material that is placed into appropriate containers. All liquids contained in the basins, including rain and rinse water, are collected, then sampled and analyzed. These accumulated liquids are only discharged to the sanitary sewer if the analytical results show contaminant concentrations below established discharge limits and a signed sewer release authorization is issued by the Environmental Monitoring and Analysis Division. If the liquids do not meet discharge criteria, they are either treated at the Area 514 Facility or shipped off site to a permitted treatment, storage, and disposal facility.

#### *3.2.5 Equipment Failure*

Procedures have been developed to manage situations in which equipment failure may cause a release of hazardous, radioactive, or mixed waste or materials. These pertain to forklifts and cranes that handle containerized loads and treatment wastes.

##### *3.2.5.1 Actions Required To Stop and Contain Waste*

When visual monitoring indicates that a leak or spill has occurred, a series of steps must be taken to evaluate the situation. These steps are structured to provide appropriate actions to (1) minimize the environmental impact and (2) determine a course of action to remedy the problem. The following actions are required after a leak caused by equipment failure is detected:

- Cease operation of the equipment.
- Isolate or remove any containers of incompatible wastes from spill vicinity if contact is possible.
- Initiate spill response in accordance with Section 3.2.6.
- Remove the waste from the system and/or secondary containment as described in Section 3.2.4.2.
- Locate the leak.
- Decontaminate the equipment.
- Repair or scrap equipment (initiate closure proceedings for scrapped permitted equipment).

##### *3.2.5.2 Repairs*

Equipment may be returned to service after the waste is removed and repairs are completed.

#### *3.2.6 Spill Response for Hazardous Materials and Waste*

Spills from Level 1 incidents are called “small incidents.” These spills may be cleaned up by Hazardous Waste Management Division personnel without notifying the LLNL Fire Department. Response procedures for Level 1 incidents are included in this document to provide guidance for Hazardous Waste Management Division personnel. This Emergency Response Plan is not considered to be implemented for Level 1 incident mitigation. Spills from Level 2, 3, and 4 incidents are called “large incidents” and must be mitigated by the LLNL Fire Department. To determine if a spill is considered a small incident, the following criteria must be met:

1. The identity of the spilled material or waste is known
2. The spilled material or waste is commonly handled by the Hazardous Waste Management Division, and the personnel are familiar with its hazards
3. The spill can be cleaned up by two people in less than 1 hr.

Building 419 Supervisor or alternate will make this determination. He or she may consult with the Hazards Control ES&H Team for help with this assessment. In case of a radioactive or mixed waste release, the Hazards Control ES&H Team is called to monitor the radioactivity levels. If personnel have any doubt about their ability to clean up a spill properly and safely, the LLNL Fire Department should be notified immediately.

### 3.2.6.1 Ten-Step Spill Response Guidance Plan

The ten-step approach from the Environmental Policy section of the Environmental Protection Department's *Environmental Protection Handbook* is followed to manage leaks and spills of hazardous, radioactive, or mixed materials and wastes. This approach is illustrated below.

#### Ten-Step Approach to Managing Leaks and Spills of Hazardous Materials and Wastes



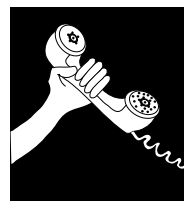
Identify the spill



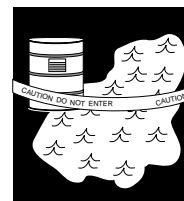
If safe, shut off the source



Eliminate ignition sources

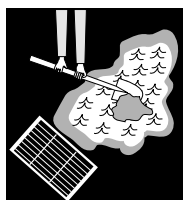


Contact your supervisor

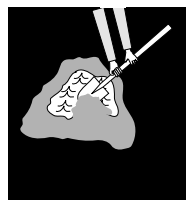


Cordon off the area

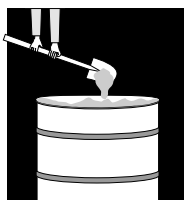
If the spill is manageable, continue with steps 6–10. If not, call the LLNL Fire Department on ext 911; if any of the above steps are not considered safe, then immediately call the Fire Department.



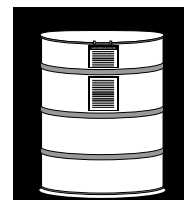
Contain



Absorb and neutralize



Clean up



Dispose of as hazardous waste



Decontaminate and restock spill equipment

Note: If direct contact with a hazardous, radioactive, or mixed waste or chemical arises from any spill response actions, personnel should do the following:

- Use eyewash or shower
- Remove contaminated clothing
- Use soap and water to scrub off contaminant.

More detailed descriptions of each step are as follows:

1. Identify the spill.
  - Stand up-wind of the spilled substance.
  - Identify wastes by information on the container labels: hazardous waste by the red/white label; radioactive waste by the yellow/white label; and mixed waste by the red/yellow label.
  - Identify wastes also by information on the Waste Disposal Requisition form.
  - Do not remain in the area if an immediate personnel hazard exists.
  - If the label cannot be read and the material cannot be positively identified, call the LLNL Fire Department on ext 911 for assistance. Cordon off the area affected by the spill until the Fire Department arrives.
2. Shut off the source of spill.
  - If waste type is known and no major hazards exist, do the following:
    - Wear PPE sufficient to protect against the material or waste spilled (see Exhibit 1 for guidelines or contact the Hazards Control Safety Team).
    - Shut off the source of the spill immediately or place the container in an upright position. Each Emergency Spill Kit contains a Drum Repair Kit; use the repair kit to plug holes or small tears in the container temporarily until the waste can be overpacked into a larger container. Prompt action can prevent a small spill from becoming a large one.
3. Eliminate ignition sources.
  - Wiring and breakers
  - Exhaust systems
  - Generators and pumps.

All sources of spark or flame in the area should be extinguished. In addition, all containers of waste incompatible with released materials should be moved away from the spill vicinity if contact is possible.
4. Contact your supervisor. Report the spill to the supervisor as soon as possible. Depending on the magnitude of the spill, the following people should be notified.
  - Supervisor
    - All spills
  - Health and Safety Technician
    - All spills
  - Environmental Analyst
    - All spills
  - LLNL Fire Department
    - Any spill that cannot be safely cleaned up by Hazardous Waste Management Division.

5. Cordon off the area (this step provides instructions for Building 419 Supervisor or alternate).
  - If the spill is manageable, evacuate all persons from the area who are not involved in cleanup operations. Make sure no unauthorized personnel enter the spill area. At this point call the Hazards Control ES&H Team if advice is needed regarding the type of PPE or containment equipment to use.
  - Have the spill area cordoned off (put up a barricade with tape or rope).
  - If the spill is too large for Hazardous Waste Management Division personnel to manage, call the LLNL Fire Department (ext 911). Evacuate all persons from the spill area. Prevent all entry to the spill area until the LLNL Fire Department arrives.
6. Contain the spill.
  - Wear personal protective equipment adequate to protect against exposure or contact with the material or waste spilled. Protective clothing can be found in the nearest Emergency Spill Kit. Additional personal protective equipment can be found in the nearest PPE locker. See Figure 4 for Spill Kit and PPE locker locations. Exhibit 1 provides general guidelines for choosing PPE. For further assistance, contact the Hazards Control ES&H Team.
  - Use the appropriate equipment from the nearest Emergency Spill Kit to contain and absorb the material or waste spilled (see Appendix B). Contact the Hazards Control ES&H Team for additional assistance.

Containment Techniques for all Liquid Waste Spills.

- Choose an absorbent material that is compatible with the material or waste spilled.
- If the spill can safely be cleaned up by Hazardous Waste Management Division personnel, efforts should be made to keep the spill from spreading. Containment is possible by damming, diking, or blocking the path of the spill. Absorbent material can be spread immediately around the spill area.
- Use absorbent socks ("Pigs") or loose absorbent to dam up waste, beginning at its point of most rapid flow and on sides where release flows toward drains or other conduits to the environment.

Techniques to Protect Drains.

- Use absorbent socks or loose absorbent material to encircle the entire drain to prevent the waste from entering.
- Add a second outside ring if absorbent material appears saturated.
- Protect floor drains, storm drains, and any other conduits to the environment by surrounding them with an absorbent dike.

7. Absorb and/or neutralize.
  - Cover the contained spill with loose, compatible absorbent material, working from the perimeter inward toward the center.
  - If neutralization of corrosive spills is desired, then an appropriate neutralizing absorbent may be substituted.

- Small spills may be absorbed solely with an absorbent sock. See Exhibit 3 for more details regarding procedures for absorbing or neutralizing spills of acid; aqueous, caustic, or flammable liquid; or oxidizer materials or wastes.
8. Clean up the area.
    - Use appropriate waste disposal containers.
    - Once the spill has been contained and absorbed, properly clean up the spent absorbent and cleanup materials. Used absorbent, clothing, and cleanup supplies that cannot be properly decontaminated must be disposed of as hazardous, radioactive, or mixed waste, as applicable. Drums or lard cans may be used to contain spent absorbent. Appropriate waste labels must be used to identify waste containers. Spill response supplies that have been used in the spill response must be replaced before Building 419 Facility operations resume.
    - Swipe samples of the spill area are taken and analyzed to verify the adequacy of cleaning effort, based on regulatory thresholds for hazardous waste classification.
  9. Dispose of hazardous waste.
    - Use existing Hazardous Waste Management Division procedures.
    - Evaluate all materials used in the spill response to determine whether they must be managed as hazardous, radioactive, or mixed waste. All regulated waste must be handled according to Hazardous Waste Management Division procedures.
    - Complete the appropriate waste label and attach to the container.
    - Initiate the Waste Disposal Requisition process.
  10. Decontaminate and restock.
    - Remember: Handle rinse water from decontamination operations as a hazardous, radioactive, or mixed waste, pending analysis results. For disposition procedure, see 3.3.1.
    - Before resuming operations, restock supplies and decontaminate equipment and PPE, if they are intended for future use. If disposable, discard in accordance with all applicable regulations.

### **3.3 Decontamination**

#### **3.3.1 Hazardous Waste Management Division Decontamination and Restocking Activities for a Small (Level 1) Incident**

All equipment, protective clothing, and other materials used in spill response are evaluated to determine whether they are contaminated with hazardous, radioactive, or mixed wastes. All nondisposable items are decontaminated. Rinse water from decontamination operations is managed as hazardous waste pending analysis. If test results indicate that rinse water is hazardous, radioactive, or mixed, then it is managed according to the relevant regulatory requirements. These accumulated liquids are only discharged to the sanitary sewer if the analytical results show contaminant concentrations below established discharge limits and a signed sewer release authorization is issued by the Environmental Monitoring and Analysis Division. If the liquids do not meet discharge criteria, they are either treated at Area 514 or shipped off-site to a permitted treatment, storage, and disposal facility. All disposable items are handled as hazardous, radioactive, or mixed waste unless test results indicate that the waste is not

subject to regulatory requirements. Swipe samples are taken of the affected area and equipment. Analytical results from swipes and rinse water are used to verify whether decontamination procedures are complete, based on regulatory thresholds for hazardous waste classification.

All hazardous, radioactive, and mixed wastes are properly packaged and labeled. A waste disposal requisition form is completed and processed for each container. Spill Kits and PPE lockers are then restocked.

3.3.2            LLNL Fire Department Decontamination Activities for Large  
(Levels 2, 3, and 4) Incidents

The LLNL Fire Department manages all decontamination efforts following large incidents. Their decontamination procedures are discussed in the LLNL *Fire Department Policies and Procedures* (Volume 1), under Tactical Plan 1607 (LLNL, 1987).

**3.4      Internal Notification**

In the event of a large hazardous, radioactive, or mixed waste spill (Level 2, 3, or 4 incident), fire, or other emergency, the observing Supervisor or designee immediately notifies the Emergency Dispatcher by dialing ext 911 on the nearest available telephone. If necessary, the Facility Operations Supervisor or alternate will initiate evacuation procedures of facility personnel (see Section 5 for more details). If any questions exist as to the magnitude of the emergency and whether or not it should be called in, Building 419 Supervisor or alternate should call the Hazards Control ES&H Team to help with the assessment.

If the decision is made to call the LLNL Fire Department, dial ext 911. The caller should remain on the line to verify that the dispatcher has the correct information and receive instructions. Once notified, the Emergency Dispatcher relays the information promptly over dedicated telephone lines to the response groups who need to respond immediately. After this communication is completed, the Dispatcher uses the best available method for notifying other personnel who are requested. This is normally accomplished using a radio page for key individuals. During off-shift hours, key personnel are notified by telephone or radio page. Response personnel are available on a 24-hour basis.

## **4. EMERGENCY EQUIPMENT**

This section briefly describes the emergency equipment located at Building 419. This equipment includes the internal and external communication systems, the fire suppression systems, the water supply, the emergency response and spill control equipment, MSDSs, the emergency lighting systems, and the decontamination equipment. Pertinent emergency equipment is listed in Exhibit 4 with location(s), a basic physical description, and a brief statement of capabilities for each item.

### **4.1 Internal Communication System**

Telephones are located throughout Building 419 (see Figure 4). During emergencies, these telephones can be used to notify the supervisor or alternate, the LLNL Emergency Dispatcher, and other key personnel of the incident. These individuals can help summon additional responders and/or initiate evacuation procedures. In addition, all Hazardous Waste Management Division Operations personnel wear radio pagers. During an emergency, they can all be paged as a group. The "Group 7" code is shown on their pager, in addition to the telephone extension to call for instructions. The Area Supervisor, his or her alternate, the Hazardous Waste Management receptionist, or Hazardous Waste Management can activate this system.

An internal paging system is installed in Building 419. This system will be accessed by dialing a designated number on a touch telephone. This system can be used to notify facility personnel of existing hazards during an emergency or to communicate an evacuation order.

### **4.2 External Communication System**

The LLNL Fire Department is notified of an incident at Building 419 through the Emergency Dispatcher who is summoned by dialing ext 911 on any telephone.

The Emergency Dispatcher alerts the LLNL Fire Department emergency responders, may also may warn personnel over the site-wide public address system of any dangers and necessary precautions, and may provide evacuation instructions. For localized emergencies, this public address system can be used to warn Building 419 Facility personnel and on-site neighbors selectively.

### **4.3 Fire Suppression System**

Fire suppression equipment at Building 419 includes fire extinguishers and water supply lines. The sprinkler system is in compliance with National Fire Protection Association (NFPA) Standard 13. The type of sprinkler heads, temperature of the heads, and location of the heads may change as necessary to improve the level of fire protection.

To ensure that sprinkler systems operate properly, employees and supervisors will observe the following:

- Enclose sprinkler heads in protective cages wherever mechanical damage may be likely.
- Keep normal and maintenance-type heat sources (i.e., torches or soldering irons) away from sprinkler heads.
- Keep equipment and other materials away from sprinkler heads to ensure that they do not interfere with the water-spray pattern.
- Allow an 18-in. clearance below sprinkler heads.

- Prohibit climbing on pipes or placing ladders against sprinkler pipes or heads.
- Provide at least a 3-ft clearance around sprinkler control valves to allow fire safety personnel access to them.

To prevent uncontrolled reactions or evolution of gases, water reactive wastes are stored in watertight containers.

The fire detection and alarm system will detect the presence of heat in the unit, automatically start the sprinklers in the unit, and alert the LLNL Fire Department. Testing (performance verification) on the sprinkler system will be performed quarterly and according to a published schedule.

#### 4.3.1 Fire Extinguishers

Fire extinguishers are manually operated, portable devices that will discharge an extinguishing agent when properly activated. They are used to control a fire during the time between discovery of the fire and arrival of the LLNL Fire Department. They are located throughout Building 419, as required by the Uniform Building Code and the Fire Code, and additional fire extinguishers are located in areas of specific fire hazards. The locations of fire extinguishers in Building 419 are shown in Figure 4. All Hazardous Waste Management Division personnel actively engaged in operations involving hazardous waste are trained in the use of fire extinguishers. **Only** trained personnel are instructed to use fire extinguishers.

#### 4.3.2 Water Supply

Building 419 is served by two water lines: one is used for operations (i.e., fire fighting and housekeeping) and one used only for drinking water, eye washes, etc. Potable water is supplied to Building 419, and several hose bibs are located in the yard for general housekeeping purposes. These hose bibs are fitted with screw-on backflow prevention devices.

### 4.4 **Response Equipment**

Several categories of emergency response equipment are available at LLNL. These include spill response equipment, response vehicles and heavy equipment, site safety equipment, PPE, emergency assembly point kits, and MSDSs.

#### 4.4.1 Spill Response Equipment

For small (Level 1) incidents, the Hazardous Waste Management Division has access to the contents of emergency spill kits in several key locations at Building 419 (see Figure 4). These kits contain all necessary equipment needed to contain a small spill. Exhibit 5 provides a complete spill kit inventory and the capabilities and limitations of each item.

The Hazardous Waste Management Division also maintains a spill response trailer containing bulk quantities of spill response equipment that are used to support the Fire Department when mitigating releases from Level 2, 3, and 4 incidents.

For large (Level 2, 3, or 4) incidents, the LLNL Fire Department maintains or has access to a mobile supply of equipment required to mitigate diverse emergencies. The Special Services Unit 1 (at Fire Station 1, Building 323) is a hazardous materials response vehicle operated by the LLNL Fire Department. It contains spill kits, absorbents, acid suits, encapsulating hazardous materials suits, self-contained breathing apparatus, test kits, and hazardous materials reference information.

#### 4.4.3 Site Safety Equipment

Eyewash stations, showers, and fire extinguishers are located throughout Building 419 as shown in Figure 4.

#### 4.4.4 Personal Protective Equipment

Safety glasses and safety shoes are required to be worn at all times when working in waste management operational areas. Booties are worn over safety shoes for certain activities, such as decontamination, or in designated areas where radioactive containers are opened. Coveralls or equivalent are required to be worn at all times by operators handling waste containers. Acid-resistant, base-resistant, solvent-resistant, or leather gloves are worn as appropriate for the waste handling activity. Face shields, goggles, or other facial and eye protection is required to be worn in accordance with the FSPs and OSPs when handling open containers of liquid waste.

Protective clothing for normal daily operations is maintained in a PPE locker located in various portions of Building 419 (see Figure 4). Although clothing in the PPE locker is intended for protection during routine waste handling operations, contents may be accessed during emergency response procedures to supplement protective clothing stored in the emergency spill kits. The PPE locker is restocked on a weekly basis and contains the items listed below:

- Assorted gloves (cotton/morticians, leather, neoprene, Viton, exam, and Nitrile)
- Booties
- Coveralls, anticontaminant (Tyvek or equivalent), disposable
- Ear plugs
- Goggles, fogless clear
- Headgear, face shields, and face shield windows
- Lab aprons (chemically resistant).

Additional self-contained breathing apparatus (SCBA) units are available from the LLNL Fire Department response vehicles, including the Special Services Unit 1 hazardous materials emergency truck, and from the LLNL Respirator Services group.

Following evaluation of hazards by the appropriate Hazards Control Department Health and Safety discipline (Industrial Hygienist, Health Physicist, or other qualified individual), the use of air-purifying respirators may be authorized during spill/emergency responses. With this authorization, NIOSH-approved, full-facepiece, air-purifying respirators equipped with combination acid gas/organic vapor/high efficiency particulate air (AG/OV/HEPA) filter cartridges are available from supplies kept for normal Hazardous Waste Management operations in an access-controlled locker in Building 514. Issue-point control for these respirators is maintained by the area's Facility Supervisors. Alternative types of air-purifying respirators selected by the cognizant Health and Safety discipline are available from the LLNL Respirator Services group in Building-324 (located in the hallway between Rooms 115 and 107).

The LLNL *Health and Safety Manual* contains more information on the LLNL policy on respirator use.

#### 4.4.5 Emergency Assembly Point Kit (Self-Help Kit)

Protective and emergency equipment is stored in the Self-Help Kit located at the evacuation assembly point for Building 419 (see Figure 2). This kit is maintained for major emergencies that

require the evacuation of Building 419 Facility personnel. It contains first-aid equipment, including a first-aid kit, blankets and stretcher. It also includes the following safety equipment: flashlights, safety glasses, gloves (plastic, leather, and cotton), and hard hats, among other items. This equipment is inspected on a monthly basis and items are replaced when necessary.

#### 4.4.6 Material Safety Data Sheets

Material Safety Data Sheets (MSDSs) list the characteristics and hazards of a chemical. The Hazards Control Industrial Hygiene Group maintains files of MSDSs for chemicals routinely used at LLNL. These MSDSs are available upon request. The LLNL Industrial Hygiene Group also subscribes to a number of MSDS services. Plant Engineering subscribes to the Information Handling Service's CHEMNET System, which provides two volumes of listed MSDSs and microfiche that contain copies of the actual MSDSs. The titles of the two volumes are:

- Index to Material Safety Data Sheets by Chemical Name/Synonym/Brand Name/Trade Name/United Nations (UN) or North America (NA) Identification Number Listing
- Index to Material Safety Data Sheets by the Chemical Abstract Registry Number/Supplier/Source.

These volumes are updated every 2 months. In addition, Hazardous Waste Management Division's Requisition Control Office maintains files on MSDSs that are supplied with Hazardous Waste Disposal Requisitions submitted by waste generators. A copy of an MSDS can also be obtained by contacting the Hazards Control Health and Safety Technician or Industrial Hygienist who services the Hazardous Waste Management Division. They will consult the listing and provide the requested MSDS. In addition, an on-line MSDS computer system is available for quick access to MSDS information.

### 4.5 **Emergency Lighting**

See Section 4.5 for the types of emergency equipment available in the event of a power outage.

### 4.6 **Decontamination Equipment**

The Hazardous Waste Management Division maintains equipment that is available to decontaminate areas that were in contact with the released hazardous, radioactive or mixed materials or wastes. This includes a steam cleaner, pressure washer and electric floor scrubber, and a mercury vacuum cleaner. The steam cleaner and pressure washer are stored at the Support Services Group Equipment yard, Building 419. The electric floor scrubber and mercury vacuum cleaner are stored in Building 625. The equipment is inspected on a monthly basis.

Building 419 maintains a wet/dry vacuum cleaner in Room 110 of Building 514. This vacuum cleaner is inspected on a monthly basis. Also located in this room (in a cabinet) are buckets, squirt bottles, rags, wipes, and cleaning solutions. This cabinet is restocked on a monthly basis, or whenever necessary. Chemical solutions used in decontamination operations are presented in Exhibit 6.

The LLNL Fire Department also maintains decontamination supplies for personnel and/or equipment decontamination. *Tactical Plan 1607* in the *LLNL Fire Department Policies and Procedures, Volume 1* (LLNL, 1987) contains a discussion of the LLNL Fire Department's decontamination equipment.

## **5. EVACUATION PLAN**

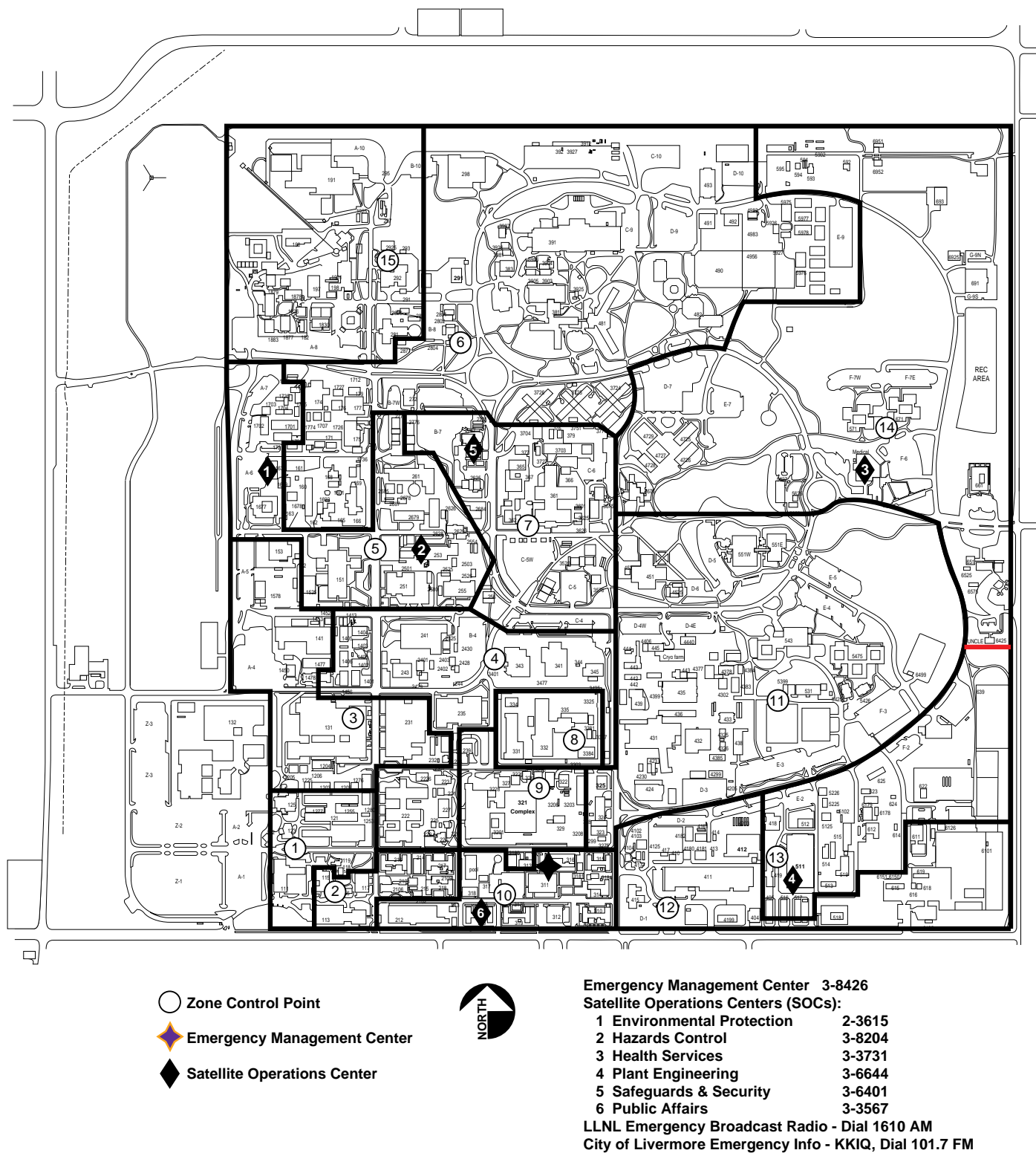
The Evacuation Plan for Building 419 and for the LLNL main site are established in the event that an emergency requires the evacuation of either the Building 419 Facility or the site.

### **5.1 Building 419 Facility Evacuation Plan**

Emergency evacuation notification of Building 419 personnel is made on the LLNL site-wide emergency paging system, on the Building 419 internal paging system (after February 1992), or through verbal instructions from the Supervisor or facility personnel. Evacuation procedures for the general facility staff, Building 419 Supervisor (or alternate), and the Assembly Point Leader are outlined in the Self Help Plan for Building 419. Evacuation routes are pictured in Figure 3.

### **5.3 LLNL Site-Wide Evacuation Plan**

If a major emergency develops that requires the evacuation of personnel from all or part of the LLNL main site, the Protective Force Division will implement actions to control evacuating personnel, protect the on-site emergency scene, and coordinate activities with outside police organizations. The Protective Force Division will initiate one of the operational responses described in the LLNL *Emergency Evacuation Plan*. An event requiring evacuation could be caused by an on-site or off-site emergency such as an earthquake, fire, explosion, or major toxic or radioactive material release. The Laboratory Emergency Duty Officer is authorized to implement area or site-wide evacuation procedures if deemed necessary after receiving a situational assessment from the Incident Officer. Authority and procedures for evacuating a single facility or a small area are not included in this Plan. In either case, the Fire Department controls the on-site emergency, and the Protective Force Division controls personnel.



**Figure 1** LLNL's Self-Help Zones as of January 1, 1992

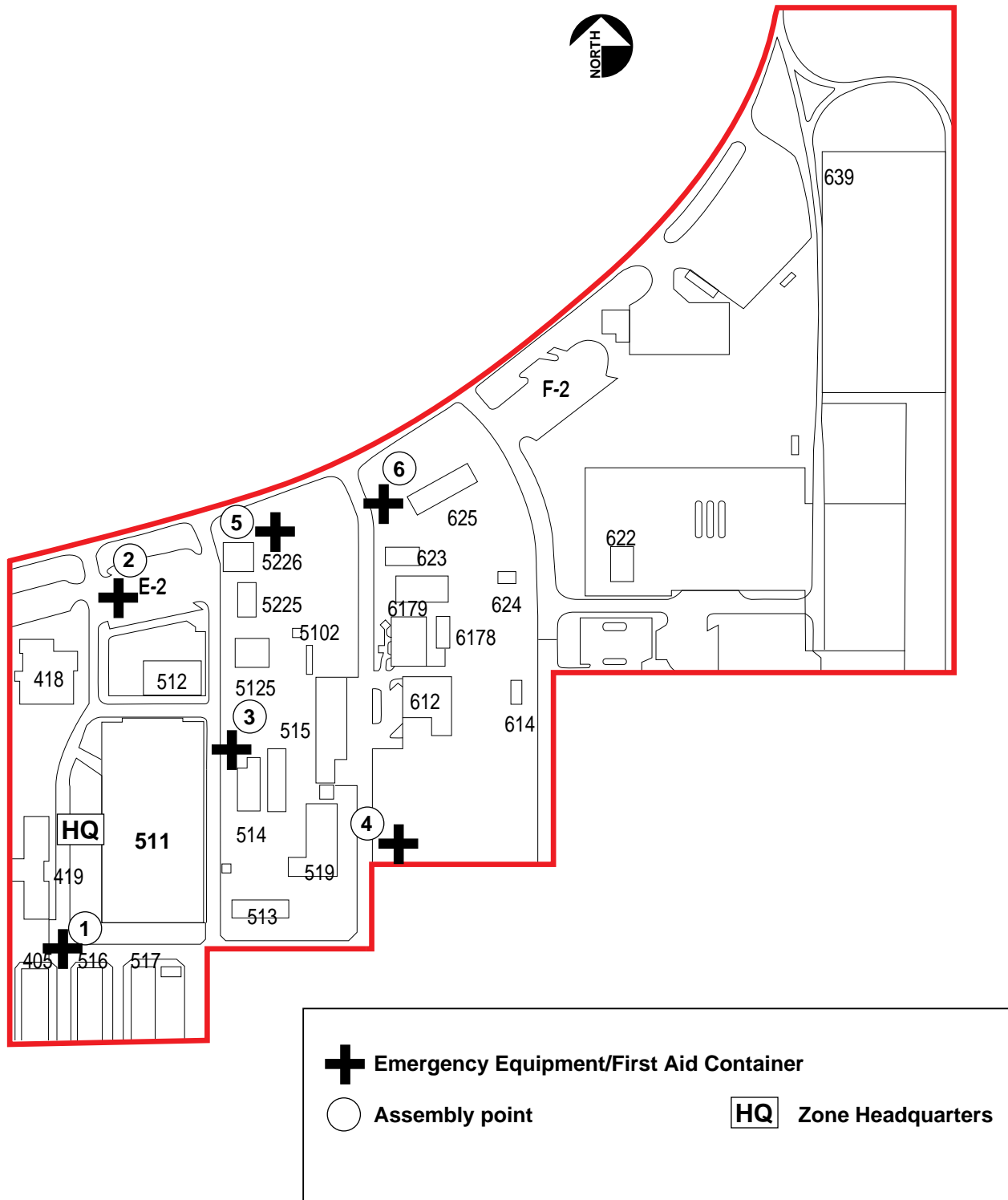
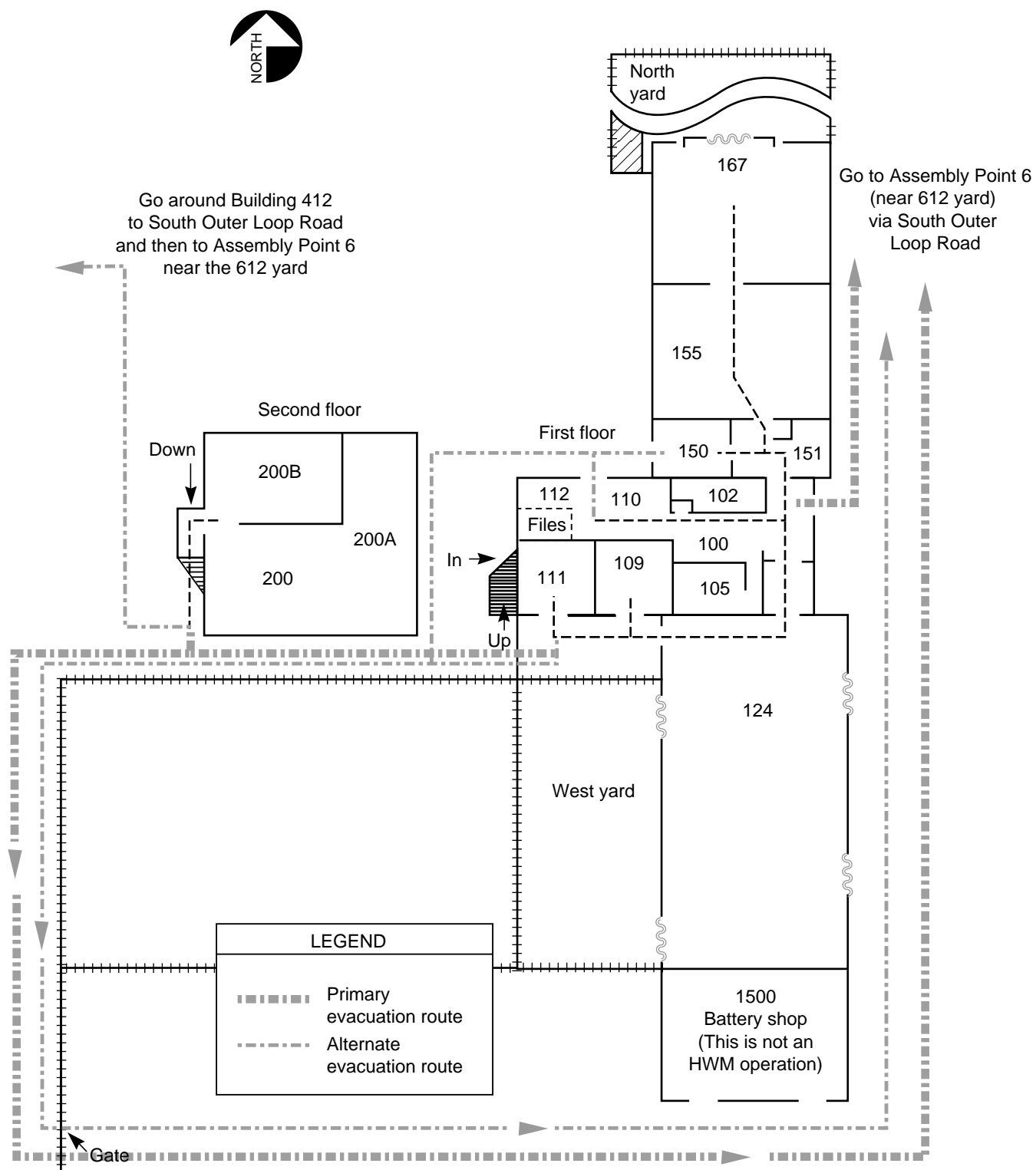
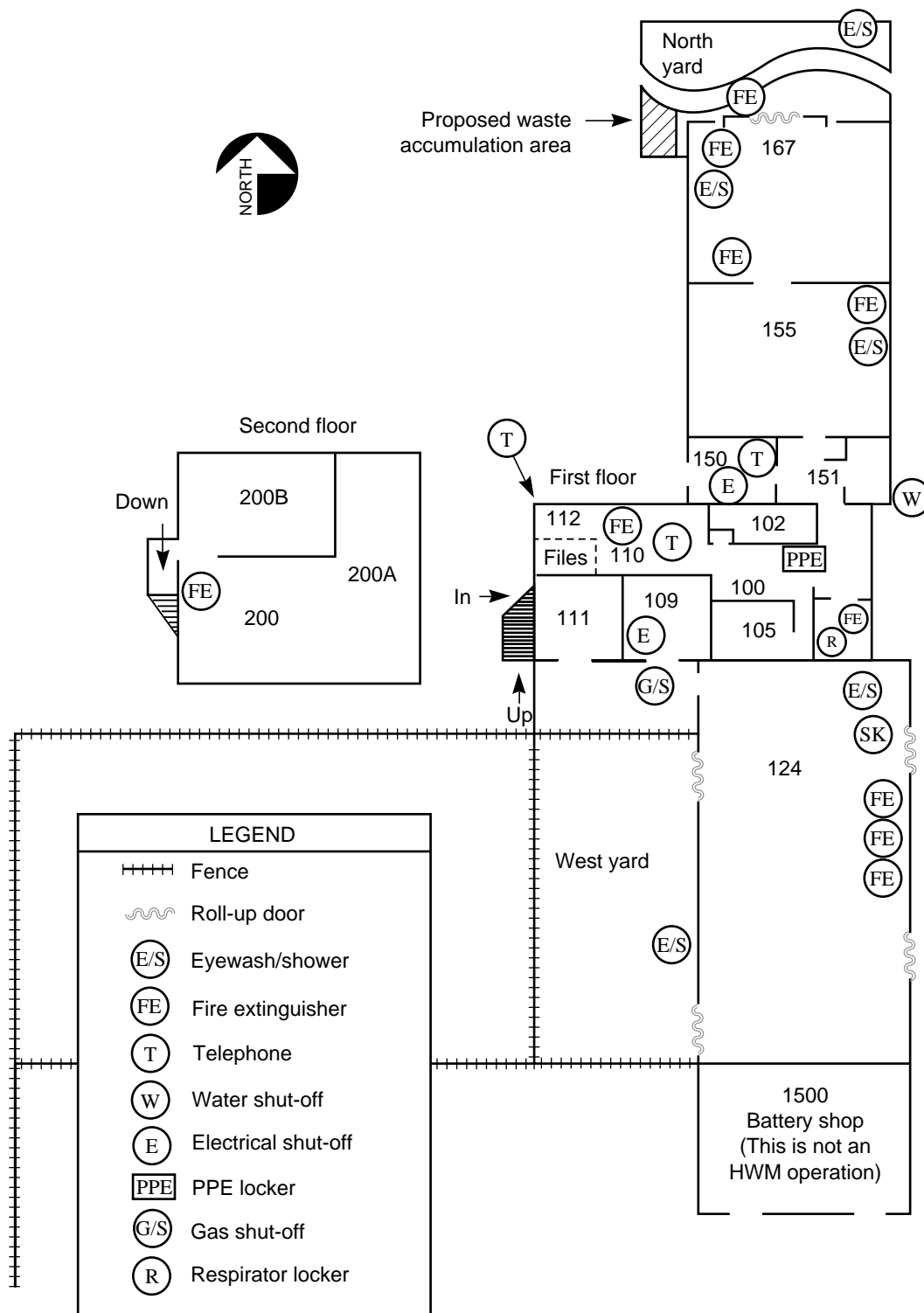


Figure 2 Self-Help Zone 13 Assembly Points



**Figure 3 Building 419 Facility Emergency Evacuation Routes**



**Figure 4 Building 419 Facility Emergency Equipment and Utility Shut-Off Locations**

**REFERENCES**

Alameda County Emergency Medical Services (1991), *Policy and Procedures Manual*, Alameda County Health Care Services Agency, Oakland, CA.

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LLNL (1992), *RCRA Part B Permit Application*, Environmental Protection Department, Lawrence Livermore National Laboratory, Livermore, CA.

## **EXHIBIT 1**

### **Personal Protective Equipment Guidelines**

**Exhibit 1 Personal Protective Equipment Guidelines \***

<b>Waste Category</b>	<b>Examples of Waste</b>	<b>Gloves</b>	<b>Protective Clothing</b>	<b>Respirator (see note)</b>
Acid Waste	Mineral Acid (sulfuric, hydrochloric, hydrobromic)	Wear poly laminate (Silver Shield or Safety 4-H) and neoprene or nitrile gloves	Full body, chemically resistant, protective coveralls (Chemrel or equivalent) and PVC** boots or polyethylene booties	Full-face air-purifying respirator with AGOV/HEPA cartridges†
	Organic Acid	Wear poly laminate (Silver Shield or Safety 4-H) and neoprene or nitrile gloves	Full body, chemically resistant, protective coveralls (Chemrel or equivalent) and PVC boots or polyethylene booties	Full-face air-purifying respirator with AGOV/HEPA cartridges†
	Perchloric Acid	Call LLNL Fire Department (ext 911)		
	Hydrofluoric Acid	Call LLNL Fire Department (ext 911)		
	Chromic Acid	Wear poly laminate (Silver Shield or Safety 4-H) and neoprene or nitrile gloves	Full body, chemically resistant, protective coveralls (Chemrel or equivalent) and PVC boots or polyethylene booties	Full-face air-purifying respirator with AGOV/HEPA cartridges†
Aqueous Waste	Spent photo chemicals, rinse waters, spent plating solutions, machine coolants	Neoprene	Polyethylene coated full body Tyvek coveralls or full body, chemically resistant, protective coveralls (Chemrel or equivalent) and polyethylene booties	Full-face air-purifying respirator with AGOV/HEPA cartridges†
Caustic Waste	Sodium hydroxide, potassium hydroxide, calcium hydroxide	Wear poly laminate (Silver Shield or Safety 4-H) and neoprene or nitrile gloves	Full body, chemically resistant, protective coveralls (Chemrel or equivalent) and PVC boots or polyethylene booties	Full-face air-purifying respirator with AGOV/HEPA cartridges†
	Ammonia	Wear poly laminate (Silver Shield or Safety 4-H) and neoprene or nitrile gloves	Full body, chemically resistant, protective coveralls (Chemrel or equivalent) and PVC boots or polyethylene booties	Full-face respirator with ammonia cartridge
Flammable Liquids Waste	Gasoline, acetone, toluene, xylene, ethanol	Wear poly laminate (Silver Shield or Safety 4-H) and neoprene or nitrile gloves	Full body, chemically resistant, protective coveralls (Chemrel or equivalent) and PVC boots or polyethylene booties	Full-face air-purifying respirator with AGOV/HEPA cartridges†
PCB Waste	PCB-contaminated oil, transformer fluid, capacitor fluid	Wear poly laminate (Silver Shield or Safety 4-H) and neoprene or nitrile gloves	Full body, chemically resistant, protective coveralls (Chemrel or equivalent) and PVC boots or polyethylene booties	Full-face air-purifying respirator with AGOV/HEPA cartridges†
Strong Oxidizers	Chromic acid, nitric acid (above 40%), perchloric acid (above 40%)	Chemical specific selection required. To be determined by Hazards Control		
	Nitrates, perchlorates, chlorine, chlorites, chlorates, peroxides, and permanganates	Chemical specific selection required. To be determined by Hazards Control		
Water Reactives <b>DO NOT USE WATER</b>	Lithium hydride, sodium and potassium metals, uranium turnings, and acetyl chlorides	Call LLNL Fire Department (ext 911)		

\* Contact Hazards Control Safety Team to verify adequacy of equipment for specific spill.

\*\* Polyvinyl chloride.

† Acid gases/organic vapors/HEPA (AGOV/HEPA).

**NOTE: Respirator use is dependent on quantity, type, and location of material spilled. They are to be used only within limitations of respirator and cartridge. Air purifying respirators will only be issued following an assessment by the appropriate Hazards Control Safety discipline. SCBA respirators may be substituted.**

## **EXHIBIT 2**

### **Equipment to Contain and Absorb Spills**

**Exhibit 2 Equipment to Contain and Absorb Spills \***

<b>Waste Category</b>	<b>Type of Equipment</b>	<b>Material</b>	<b>Additional Equipment*</b>
Acid	absorbent socks	Polyethylene pulp	polypropylene shovels polyethylene bags brooms (chemically resistant) dust pan (chemically resistant) caution tape pH paper
	absorbent (loose)	Silicates (Floor Dry: diatomaceous earth or equivalent)	
	acid neutralizer/absorbent	Magnesium oxide, sodium bicarbonate, Neutrasorb, Kolor-Safe acid, or equivalent	
Aqueous	absorbent socks	Polyethylene pulp	polypropylene shovels polyethylene bags brooms (chemically resistant) dust pan (chemically resistant) caution tape
	absorbent (loose)	Silicates (Floor Dry: diatomaceous earth or equivalent)	
Caustic	absorbent socks	Polyethylene pulp	polypropylene shovels polyethylene bags brooms (chemically resistant) dust pan (chemically resistant) caution tape pH paper
	absorbent (loose)	Silicates (Floor Dry: diatomaceous earth or equivalent)	
	caustic neutralizer	Spill-x-c, Neutrakit, Kolor-Safe base, or equivalent	
Flammable Liquids	absorbent socks	Polyethylene pulp	polypropylene shovels polyethylene bags brooms (chemically resistant) dust pan (chemically resistant) caution tape
	absorbent (loose)	Silicates (Floor Dry: diatomaceous earth or equivalent)	
	solvent absorbent	Spill-x-s, Solusorb, or equivalent	
	detergent	Powerclean 151 or equivalent	
Strong Oxidizers	absorbent socks	Polyethylene pulp	polypropylene shovels polyethylene bags
	absorbent (loose)	Silicates (Floor Dry: diatomaceous earth or equivalent)	brooms (chemically resistant) dust pan (chemically resistant) caution tape pH paper

\* See Exhibit 5 (Emergency Spill Kit Supplies) for a more complete list.

## **EXHIBIT 3**

### **Waste Absorption and Neutralization Procedures**

**Exhibit 3 Waste Absorption and Neutralization Procedures**

<b>Waste Category</b>	<b>Procedure to Absorb and/or Neutralize</b>
Acid	<p>Contain the spill by surrounding it with absorbent socks or by diking the perimeter with scoops of loose absorbent material compatible with the substance spilled. Begin at the side(s) where flow is most rapid and on side(s) where release flows toward drains or other conduits to the environment. Next, cover the spill with loose, compatible absorbent material, working from the perimeter inward toward the center. Use sufficient quantities to completely cover the liquid. An acid neutralizing absorbent may be substituted, if neutralization is desired. Carefully stir the absorbent-covered spill with a shovel. The mixture will change color when the acid is neutralized.</p> <p>Very small spills may be contained and absorbed solely with an absorbent sock.</p> <p>When the spill is completely soaked up, discard all absorbent material as hazardous waste. Use a shovel to scoop up the loose absorbent. A chemically resistant broom and dust pan may be used to sweep up absorbent residue.</p> <p>Use wetted absorbent towels or pads to clean surface area until it tests neutral with pH paper.</p>
Aqueous	<p>Contain the spill by surrounding it with absorbent socks or by diking the perimeter with scoops of loose absorbent material compatible with the substance spilled. Begin at the side(s) where flow is most rapid and on side(s) where release flows toward drains or other conduits to the environment. Next, cover the spill with loose compatible absorbent material, working from the perimeter inward toward the center. Use sufficient quantities to completely cover the liquid. Carefully stir the absorbent-covered spill with a shovel.</p> <p>Very small spills may be contained and absorbed solely with an absorbent sock.</p> <p>When the spill is completely soaked up, discard all absorbent material as hazardous waste. Use a shovel to scoop up the loose absorbent. A chemically resistant broom and dust pan may be used to sweep up absorbent residue.</p> <p>Use wetted absorbent towels or pads to clean surface.</p>
Caustic	<p>Contain the spill by surrounding it with absorbent socks or by diking the perimeter with scoops of loose absorbent material compatible with the substance spilled. Begin at the side(s) where flow is most rapid and on side(s) where release flows toward drains or other conduits to the environment. Next, cover the spill with loose, compatible absorbent material, working from the perimeter inward toward the center. Use sufficient quantities to completely cover the liquid. A caustic neutralizing absorbent may be substituted, if neutralization is desired. Carefully stir the absorbent-covered spill with a shovel. The mixture will change color when the caustic is neutralized.</p> <p>Very small spills may be contained and absorbed solely with an absorbent sock.</p> <p>When the spill is completely soaked up, discard all absorbent material as hazardous waste. Use a shovel to scoop up the loose absorbent. A chemically resistant broom and dust pan may be used to sweep up absorbent residue.</p> <p>Use wetted absorbent towels or pads to clean surface area until it tests neutral with pH paper.</p>
Flammable Liquid	<p>Contain the spill by surrounding it with absorbent socks or by diking the perimeter with scoops of loose absorbent material compatible with the substance spilled. Begin at the side(s) where flow is most rapid and on side(s) where release flows toward drains or other conduits to the environment. Next, cover the spill with loose compatible absorbent material, working from the perimeter inward toward the center. Use sufficient quantities to completely cover the liquid. Carefully stir the absorbent-covered spill with a shovel.</p> <p>Very small spills may be contained and absorbed solely with an absorbent sock.</p> <p>When the spill is completely soaked up, discard all absorbent material as hazardous waste. Use a shovel to scoop up the loose absorbent. A chemically resistant broom and dust pan may be used to sweep up absorbent residue.</p> <p>Use wetted absorbent towels or pads to clean surface.</p> <p>Seal contaminated clothing and absorbent material in a vapor-tight container.</p>

**Exhibit 3 Waste Absorption and Neutralization Procedures (Continued)**

<b>Waste Category</b>	<b>Procedure to Absorb and/or Neutralize</b>
Acid Oxidizer	<p>Contain the spill by surrounding it with absorbent socks or by diking the perimeter with scoops of loose absorbent material compatible with the substance spilled. Begin at the side(s) where flow is most rapid and on side(s) where release flows toward drains or other conduits to the environment. Next, cover the spill with loose, compatible absorbent material, working from the perimeter inward toward the center. Use sufficient quantities to completely cover the liquid. An acid neutralizing absorbent may be substituted, if neutralization is desired. Carefully stir the absorbent-covered spill with a shovel. The mixture will change color when the acid is neutralized.</p> <p>Very small spills may be contained and absorbed solely with an absorbent sock.</p> <p>When the spill is completely soaked up, discard all absorbent material as hazardous waste. Use a shovel to scoop up the loose absorbent. A chemically resistant broom and dust pan may be used to sweep up absorbent residue.</p> <p>Use wetted absorbent towels or pads to clean surface area until it tests neutral with pH paper.</p>
Other Oxidizer	<p>Contain the spill by surrounding it with absorbent socks or by diking the perimeter with scoops of loose absorbent material compatible with the substance spilled. Begin at the side(s) where flow is most rapid and on side(s) where release flows toward drains or other conduits to the environment. Next, cover the spill with loose compatible absorbent material, working from the perimeter inward toward the center. Use sufficient quantities to completely cover the liquid. Carefully stir the absorbent-covered spill with a shovel.</p> <p>Very small spills may be contained and absorbed solely with an absorbent sock.</p> <p>When the spill is completely soaked up, discard all absorbent material as hazardous waste. Use a shovel to scoop up the loose absorbent. A chemically resistant broom and dust pan may be used to sweep up absorbent residue.</p> <p>Use a wetted absorbent pad to clean surface.</p>

Note: If radioactive materials are included in the spill, the Health Physicist is contacted for an assessment and relevant swipe analysis.

## **EXHIBIT 4**

### **Emergency Equipment List and Schedule for Testing**

**Exhibit 4 Emergency Equipment List and Schedule for Testing\***

<b>Item</b>	<b>Building Location</b>	<b>Physical Description</b>	<b>Capabilities</b>	<b>Inspection Frequency</b>	<b>Responsible Person/ Group</b>
Telephones	See Figure 4	Touch tone telephone	Calling supervisor, emergency dispatcher, or other key personnel; and to access paging system throughout the facility	Weekly	Hazardous Waste Management Facility Supervisor
LLNL Emergency Public Address System	All buildings and the Area 612 Facility Yard have speakers	This PA System was fabricated for LLNL; audible from any point at the laboratory	Site-wide or selected area voice information system.	Annual	LLNL Plant Engineering
Radio pagers	Worn by all operations personnel who handle hazardous waste at all Hazardous Waste Management Facilities	Small, battery operated, personnel radio pagers worn by Hazardous Waste Management operations personnel.	Informing personnel that they should call a certain extension for instructions	Daily (when-in-use)	Hazardous Waste Management Operations Personnel
Eye Wash Stations	See Figure 4	Two soft-spray outlet heads equipped with float-off dust covers to keep out contaminants.	Used to flush irritants and/or toxics from the eyes without causing further injury.	Weekly	Hazardous Waste Management Facility Supervisor
Emergency Showers	See Figure 4	High visibility ABS plastic shower head with IPS stay-open ball valve	Used to wash irritants and/or toxics from skin without causing further injury	Weekly	Hazardous Waste Management Facility Supervisor
Emergency Assembly Point Kit (Self-Help Kit)	See Figure 2 Weather-proof box	See Section 4.4.5	Contains first aid and other emergency equipment to be used in the event of an emergency	Monthly	Hazardous Waste Management Support Services Supervisor
Emergency Electric Generators and Flood Lights	Portable generators in B419 and in the Spill Res-ponse Trailer in B612 yard	Gas-powered portable electricity generators (1500 watt/3 hp)	Provides electricity for emergency lighting or equipment	Monthly	Hazardous Waste Management Support Services Supervisor
Emergency Lighting	B612 Room 107	Dual beam battery pack	Provides lighting during power outages or emergency situations	Monthly	Hazardous Waste Management Support Services Supervisor

\*Maintenance performed as necessary based upon inspection results.

**Exhibit 4 Emergency Equipment List and Schedule for Testing (Continued)**

<b>Item</b>	<b>Building Location</b>	<b>Physical Description</b>	<b>Capabilities</b>	<b>Inspection Frequency</b>	<b>Responsible Person/ Group</b>
Berms and secondary containment	Building 419 Facility	Cement, asphalt, and other engineering control structures used to store and provide containment of wastes during normal operations and emergencies	Physical barriers used to segregate, store, and contain wastes	Weekly	Hazardous Waste Management Facility Supervisor
Portable Pumps	B612 Room 100 Pump-out truck	Gas- and diesel-powered trash pumps in various sizes	Used to remove standing water from berms and to pump out tanks and sumps	Daily (when-in-use)	Hazardous Waste Management Facility Supervisor
Auxiliary Fire Hoses (1.5-in. Water Hook-ups)	Building 514 (east side)	1.5-inch hose connections compatible with standard Fire Department hoses	Normally used for everyday operations but can be used as backup fire hoses, if necessary	Monthly	Hazardous Waste Management Support Services Supervisor
Decontamination Equipment	Support Services Group Equipment Yard (located north of B419)	Steam cleaner, pressure washer	Cleaning up residue in areas which came in contact with released hazardous, radioactive, or mixed wastes.	Monthly	Hazardous Waste Management Support Services Supervisor
	Building 514 Room 110	Wet/dry vacuum, squirt bottles, wipes, cleaning solutions, buckets, and rags	Used to help decontaminate and clean up small Level 1 spills and for routine decontamination operations	Weekly	Hazardous Waste Management Facility Supervisor
	Building 625	Hg vacuum, electric floor scrubber	Cleaning up residue in areas which came in contact with released hazardous, radioactive, or mixed wastes.	Monthly	
Spill Response Trailer	Parked on the north side of the Area 612-2 Container Storage Unit	Trailer stocked with bulk emergency spill response equipment	Backup to LLNL Fire Department for large spill mitigation	Weekly	Hazardous Waste Management B612 Facility Supervisor
Vehicles, Forklifts, Cranes	Building 419 Facility	Operational equipment used in the handling and movement of waste containers; may also be used in emergency situations	Transportation vehicles lifting devices and other equipment that transports waste	Daily (when-in-use)	Hazardous Waste Management Facility Supervisor

**Exhibit 4      Emergency Equipment List and Schedule for Testing (Continued)**

[illegible]

## **EXHIBIT 5**

### **Emergency Spill Kit Supplies for the Building 419 Facility**

**Exhibit 5 Emergency Spill Kit Supplies for Building 419**

Unit	Quantity	Item/Specifications	Capabilities	Limitations
Each	3	Chemically resistant protective coveralls (Chemrel or equivalent)	Provides for chemical and abrasion resistance. Resistant to acids (including hydrofluoric), caustics (including sodium hydroxide 50%), organic solvents (including acetone 90%), PCBs, petroleum oils, and many other chemicals. Elastic wrists and ankles provide splash protection.	Disposable coverall designed for limited contact during chemical response activities. Limited breakthrough protection for: ethers (1 min), bromine liquid 99% (3 min), chloroform 99% (4 min), carbon disulfide (5 min), methylene chloride 99% (5 min).
Each	3	Face shields with clear windows (polycarbonate shield)	Chemically resistant face shield for splash protection. Complies with ANSI Z87.1-1989.	Must be worn with safety glasses.
Each	3	Goggles, clear (chemically resistant, polycarbonate lens)	Provides resistance and splash protection against mild acids, caustics, aromatic hydrocarbons, and methylene chloride. Complies with ANSI Z87.1-1989.	Provides limited vapor protection. Does not provide complete face protection; eye protection only.
Pair	8	Gloves, neoprene	Case-hardened latex neoprene provides exceptional protection against abrasions, cuts, punctures, and a wide range of chemicals. Suggested for petrochemicals, degreasers, oils, acids, caustics, alcohols, and solvents.	Limited breakthrough protection for acetone (12 min), chloroform (12 min), methylene chloride (6 min), toluene (14 min), and trichloroethylene (11 min).
Pair	8	Gloves, poly laminate (Silver Shield, Safety 4-H or equivalent)	Recommended for immediate response situations involving morpholine, vinyl chloride, acetone, ethyl ether, solvents, and caustics. Breakthrough time for most chemicals is >6 hr (except for methylamine and ethylamine).	Provides limited protection when in contact with ethylamine (70%) and methylamine (40%). (Always use with Neoprene gloves)
Pair	6	Booties, plastic clear, impervious (polyethylene, disposable)	May be used for contamination control, to be worn over protective safety boots. Low concentrations of liquids and vapors, PCBs.	Avoid contact with halogenated hydrocarbons and aromatic hydrocarbons.
Each	6	Absorbent socks (polyester sock filled with polyethylene absorbent specifically designed for acids, bases, solvents, and other aggressive chemicals).	Rapidly absorbs concentrated acids, bases, and solvents, as well as the following: hydraulic fluids, oils, PCBs, organic solvents (e.g., acetone), and coolants. Especially designed for nitric acid, caustics, sodium hydroxide, and most acids (including hydrochloric and sulfuric).	Formaldehyde solutions not to exceed 37%. Strong oxidizing agents may degrade product over an extended period of time.

**Exhibit 5 Emergency Spill Kit Supplies for Building 419 (Continued)**

Unit	Quantity	Item/Specifications	Capabilities	Limitations
Bag	2	Absorbent, 25 lb (Floor Dry or calcined chemically inert diatomaceous earth)	For use as an all purpose oil, grease, and water absorbent. Essentially dust free.	Do not use with hydrofluoric acid or hot alkali solutions.
Package	2	Acid neutralizer (magnesium oxide, sodium bicarbonate, Neutrasorb, or Kolor-Safe acid)	Neutralizes many mineral and organic acids including sulfuric, hydrochloric, and nitric.	May be used for hydrofluoric acid up to 48%.
Package	2	Caustic neutralizer (Spill-x-c, Neutrakit, Kolor-Safe base, or equivalent)	For use on many caustics including sodium hydroxide 50% and ammonium hydroxide 29%.	Limited use for 29%–50% concentrations of caustics. Not recommended for acids, solvents.
Each	1	Drum uprighting tool (drum upender, steel construction equipped with 1.5 in. hook)	Tool to provide leverage to lift drums that have been tipped over to move from horizontal to standing position.	No limitations given. (This is a nonsparking tool)
Each	1	Drum repair kit (Lab Safety Supply Series "D" or equivalent)	Fast, temporary repairs for leaking drums. Restrains all common container leaks due to punctures, cracks, or deterioration. Includes items such as hose tape, seals for pinhole punctures, rubber patches, lead wool and epoxy putty for cracks, "T" bolt patches with neoprene pads, plugs, ball plugs, and felt-covered wooden plugs.	Designed for temporary restraint and repairs to drums only. Does not provide long-term repair.
Each	1	Shovel, plastic, short handle (chemically resistant, nonsparking polypropylene)	Provides for cleanup of absorbent and solids. Resists damage from chemicals and corrosion.	Contains no antistatic agent.
Each	1	Broom handle for push broom	To be used with broom head for sweeping absorbents.	Not applicable.
Each	1	Broom head, push (chemically resistant)	Broom has polyethylene head with chemically resistant polypropylene bristles that will not absorb liquids.	Avoid contact with halogenated hydrocarbons and aromatic hydrocarbons.
Each	2	Broom, shop, rattail (chemically resistant)	Broom has polyethylene head with chemically resistant polypropylene bristles that will not absorb liquids.	Avoid contact with halogenated hydrocarbons and aromatic hydrocarbons.
Each	2	Dust pan (chemically resistant, polyethylene)	To be used in conjunction with brooms for cleanup of absorbent or solids.	Avoid contact with halogenated hydrocarbons and aromatic hydrocarbons.

**Exhibit 5 Emergency Spill Kit Supplies for Building 419 (Continued)**

Unit	Quantity	Item/Specifications	Capabilities	Limitations
Each	1	Ratchet, 1/2-in. drive with 15/16-in. socket	Used to remove bolts from rings on ring-top drum.	Must be used with standard drum-ring bolts.
Each	1	Wrench, bung, non-sparking	Used for tightening and loosening drum fittings.	Must be used on standard drum plugs and fittings.
Roll	1	Tape, caution: "Caution Do Not Enter" (heavy-duty, polyethylene)	Alerts workers and bystanders of hazardous areas or dangerous conditions.	Not applicable.
Each	6	Bag, poly, 3 ft by 5 ft (heavy-duty 6 mil polyethylene bags)	To contain and dispose of used absorbent materials associated with spill cleanup.	Avoid contact with halogenated hydrocarbons and aromatic hydrocarbons.
Each	1	Marker, paint tip, black	All purpose labeling pen, writes on plastic, glass, ceramic, metal, rubber, leather, film, and wax paper. Permanent, fadeproof, smudgeproof.	Not applicable.
Pack	1	Paper, pH (general purpose 0–13)	Provides quick and accurate determination of acids and bases in the field. Range 0–13.	Recommended for pH determinations between 0–13. Accuracy $\pm 0.5$ pH unit.
Box	2	Wipes (Kaydry or equivalent)	Soft cellulose fibers absorb water, solvents, and oils.	Combustible.
Each	1	Flashlights with batteries	Provides emergency lighting in areas of low visibility.	Batteries are checked and replaced as needed on a quarterly basis.
Roll	1	2 in. tape (duct or vinyl)	Seals protective clothing.	Not applicable.

## **EXHIBIT 6**

### **Decontamination Agents**

**Exhibit 6 Decontamination Agents**

Contaminant	Localized Area	Widespread Area
Radioactive materials	<ol style="list-style-type: none"> <li>1. Brush and detergent*</li> <li>2. Mild acid solution†</li> <li>3. Top layer removal†</li> </ol>	<ol style="list-style-type: none"> <li>1. High-pressure steam and water</li> <li>2. Mild acid solution†</li> <li>3. Top layer removal†</li> </ol>
Metals	<ol style="list-style-type: none"> <li>1. Brush and detergent*</li> <li>2. Chelating agent (EDTA disodium salt)</li> <li>3. Top layer removal</li> </ol>	<ol style="list-style-type: none"> <li>1. High-pressure steam and water</li> <li>2. Chelating agent (EDTA disodium salt)†</li> <li>3. Top layer removal†</li> </ol>
Oil and grease	<ol style="list-style-type: none"> <li>1. Brush and detergent*</li> <li>2. High-pressure steam and water†</li> <li>3. High-pressure steam with trisodium phosphate†</li> </ol>	<ol style="list-style-type: none"> <li>1. High-pressure steam and water</li> <li>2. High-pressure steam with trisodium phosphate†</li> <li>3. Top layer removal†</li> </ol>
Solvents and organic compounds	<ol style="list-style-type: none"> <li>1. Brush and detergent*</li> </ol>	<ol style="list-style-type: none"> <li>1. High-pressure steam and water</li> <li>2. High-pressure steam with trisodium phosphate†</li> </ol>
PCBs	<p>Decontamination using kerosene in accordance with 40 CFR 761.79</p> <ol style="list-style-type: none"> <li>a. Any PCB container to be decontaminated shall be decontaminated by flushing the internal surfaces of the container three times with a solvent. The solubility of PCBs in the solvent must be five percent or more by weight. Each rinse shall use a volume of the normal equal to approximately ten (10) percent of the PCB container capacity. The solvent may be reused for decontamination until it contains 5 ppm PCB. The solvent shall then be disposed of as a PCB in accordance with provisions of 761.60(a) 4 and CCR, Title 22.</li> <li>b. Moveable equipment used in storage areas shall be decontaminated by swabbing surfaces that have contacted PCBs with a solvent meeting the criteria of paragraph (a) of this section.</li> </ol> <p>Note: Precautionary measures should be taken to ensure that the solvent meets safety and health standards as required by applicable Federal regulations.</p>	<ol style="list-style-type: none"> <li>1. High-pressure steam or water</li> <li>2. High-pressure steam with trisodium phosphate†</li> <li>3. Remove soil, asphalt, and top layer of cement†</li> </ol>

\* Detergent to be used must contain trisodium phosphate.

† Only to be used if first procedural step fails to remove contamination.

## References:

Unterberg, W., R. W. Melvoid, *et al.* (1989), *Reference Manual of Countermeasures for Hazardous Substance Release*, Hemisphere Publishing.

Esposito, M. P., *et al.* (1987), *Decontamination Techniques for Buildings, Structures and Equipment*, Noyes Data.



